

# The Commercial Car Journal

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## GASOLINE CORPORATION ELECTS OFFICERS

Permanent organization of the Gasoline Corporation, New York City, which was recently incorporated in Delaware with \$10,000,000 capital, has been perfected by the election of the following officers and directors: Charles J. Greenstreet, president; Franklin G. Colby, vice-president and treasurer; Henry O. Evans, secretary; directors, Charles J. Greenstreet, I. M. Simonin, Franklin G. Colby, Henry O. Evans, James Scott, Robert Seeger and Harry B. Fardwell. The corporation has acquired the three plants of the Consolidated Oil Refining Co.

Mr. Greenstreet is the inventor of the Greenstreet process for manufacturing and refining gasoline, the process to be used by the new gasoline corporation. He has built up his testing plant to the commercial scale, has three refineries with a capacity of 10,000,000 gallons a year, and has orders on hand, sufficient to take care of 100,000,000 gallons over the next year. The process not only produces 50 to 100 per cent. more gasoline from crude oil, but also produces from 65 to 85 per cent. of gasoline from the refuse of the other refineries.

The plants now operating have a capacity of 10,000,000 gallons per year, and it is expected that they will turn out at the rate of 20,000,000 gallons of gasoline by August 1st.

## HORSE-DRAWN TRUCKS AND STREET CARS CAUSE MORE ACCIDENTS THAN MOTOR TRUCKS

Some highly illuminating figures are contained in the classified tables of highway accidents soon to be published in the annual report of the Police Department of New York City for the year 1915.

The tables show that of 10,653 accidents of which the causes were given, 8,661, or more than 81 per cent., were due to the fault or incapacity of the injured person, and only 700, or 6½ per cent., to the fault of the driver.

Horse-drawn trucks and wagons caused 100 fatalities and injured 2,341 persons, while motor trucks and delivery wagons killed 105 during the year and injured 1,107. Passenger automobiles caused 177 fatalities and injured 4,688.

Presented in the most detailed way of any street accident records prepared by any city in the country, the New York Police report merits careful study by everyone interested in the subject. It shows conclusively that the most effective ways of reducing the number of highway acci-

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dents are to provide playgrounds for children and keep them out of the streets and to educate pedestrians of all ages to observe as much caution in crossing the streets as drivers observe in handling their vehicles, whether horse-drawn or motor driven.

The record is taken to show the fallacy of attempting to reduce accidents materially by requiring all operators of motor vehicles to be licensed while no such regulation is applied to drivers of horse-drawn vehicles.

Even more evident is considered the uselessness and unfairness of enacting ordinances requiring the fitting of safety fenders to motor trucks, which caused less than half as many accidents as horse-drawn wagons. Street cars, which are equipped with fenders, killed 77 and injured 1,694 persons during the year, as against 105 killed and 1,107 injured by motor trucks, although there were only 12,000 electric street cars in operation in the city, including subway and elevated cars, as compared with 12,575 commercial motor vehicles, which were not fitted with fenders.

## AUTO PARTS MAKERS IN BIG MERGER

A big merger has been formed by the Rands Mfg. Co., Vanguard Mfg. Co., Superior Mfg. Co., Universal Metal Co., and the Diamond Mfg. Co., to be known as the Motor Products Corp. The new company is capitalized at \$10,000,000 and will have its main office in New York City and its headquarters office in Detroit. W. C. Rands, president of the Rands Mfg. Co., is president of the new concern; D. B. Lee, vice-president of the Diamond Mfg. Co., treasurer and general manager; C. F. Jensen, president of the Vanguard Mfg. Co., vice-president and director of purchases; H. H. Seeley, president of the Superior Mfg. Co., vice-president and sales manager; M. Louis Brown, treasurer of the Universal Metal Co., secretary, and also manager of the tube mill, and R. R. Seeley, production manager. It is proposed to build a large plant to take the place of the four Detroit ones, erect a new factory in Walkerville, and enlarge its factory in Ann Arbor.

Due to the prominence of the companies, the properties of which have been taken over by the Motor Products corporation, in the windshield manufacturing field, it might appear that windshields will be the main product of the corporation. W. C. Rands, in a concise and clear statement, of the plans of the company, however, said that the company had many other fields of manufacturing in view and that, among other plans of the organization, was the installation of a drop forge plant and the addition of a large screw machine department to the activities of the organization.

Eventually the windshield business of the corporation will be not over 30 per cent. of the total business, said Mr. Rand.

## EXPORTS OF AUTOMOBILES INCREASE ONE HUNDRED AND FIFTY-SEVEN PER CENT

Automobile exports continue to grow at an almost unbelievable rate, as shown by the latest monthly summary of the Department of Commerce. March shipments this year were very nearly double those of March, 1915—7,418 vehicles against 3,768. In the nine months period ended with last March, 55,140 motor vehicles, valued at \$72,900,346, were exported as compared with 17,876, valued at \$28,289,218, exported in the corresponding period one year ago, and 20,471, valued at \$18,765,656, two years ago. This is an increase of 157 per cent. in value in one year and of 288 per cent. in two years.

Exports of passenger cars more than tripled both in number and value in the last year, and those of commercial vehicles were more than 2½ times as great as in the nine months period a year ago.

### MACAULEY BECOMES PACKARD PRESIDENT

At a recent meeting of the stockholders of the Packard Motor Car Co., Alvan Macauley was tendered the title of president of the company in recognition of his service incident to the upbuilding of the Packard organization. Mr. Macauley has virtually been president of the company for the past two years, Henry B. Joy having devoted most of his time to working along the lines of military preparedness, and as Mr. Macauley has for some time been performing the duties of the president's office, it was at the request of Mr. Joy that the title of the presidency was given to Mr. Macauley in recognition of his services.

The company also voted to increase its capital by \$5,000,000 common stock at par

### GAS COMPANY TO MAKE GASOLINE

Manufacturers' Gas Co., McKinley, Pa., which supplies many cities and towns in northwestern Pennsylvania and western New York with gas for manufacturing and domestic purposes, will make gasoline by the method of abstracting it from gas by the use of oil.

The company gets approximately 10,000,000 cu. ft. of gas daily from the Jefferson and Elk county fields, and all of this is to be used in making gasoline. A test of the gas has recently been completed and good results have been obtained by the new method.

The test showed that about one and a half pints of gasoline could be manufactured from 1000 cu. ft. of gas. This is in

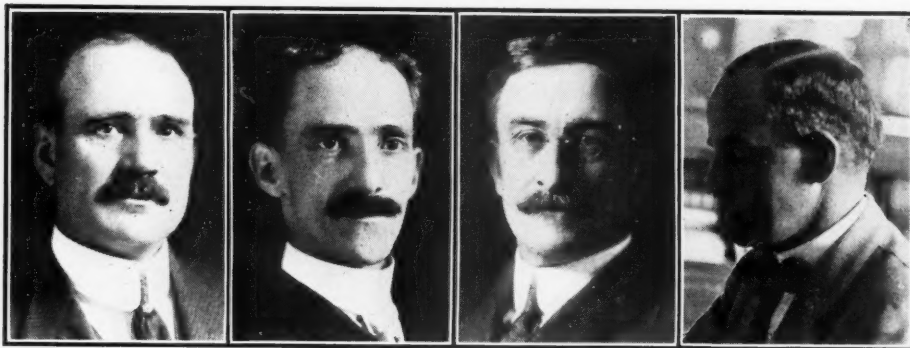
The general process, except for the utilization of the gas under high pressure, is identical with that of absorbing benzol and toluol vapors from coke-oven gases. Recent tests have showed that by the new method the gas is not weakened to any extent for heating purposes by the gasoline being extracted, although from four to eight cu. ft. of gas disappeared from each 1000 ft. of natural gas treated.

### COFFIN SPEAKS ON INDUSTRIAL PREPAREDNESS

At the recent meeting of the Indiana Section, Howard E. Coffin, vice-president of the Hudson Motor Car Co., of Detroit, spoke on the subject of preparedness, not of the military sort, but of an industrial character. This was Coffin's first public appearance in connection with the subject of his address, and was of more than passing moment because he is Chairman of the Committee on Industrial Preparedness, which is a sub-division of the Naval Consulting Board. The meeting was presided over by F. E. Moscovics, of the Nordyke & Marmon Co., and was followed by a dinner. The following officers were elected: J. J. Cole, president of the Cole Motor Car Co., chairman of the Indiana Section for the coming year; F. E. Moscovics, vice-chairman; C. E. Jeffers, of the Nordyke & Marmon Co., secretary, and R. H. Combs, Prest-O-Lite Co., treasurer. W. G. Walls, chief engineer of the National Motor Vehicle Co., was elected to the board of governors.

Coffin's address was the principal subject of the evening. He expressed the earnest belief that the only kind of preparedness that can be carried to a satisfactory conclusion in this country is industrial preparedness.

"It is a matter of our common knowledge that we are not a militaristic nation," he stated. "Sabre-clanking is not in our line and never will be for any great length of time. It should be clear to us, therefore, that if we are to adopt any policy of preparedness—and expect it to be a consistent policy which can be maintained through the years of peace as it must be if we are ever to be fitted to defend this country when war threatens—that policy must be one in keeping with the traditions and high ideals of this nation."



**Prominent Men of the Industry Who Have Assumed New Duties**

Reading from left to right: Charles W. Nash; W. C. Leland; Henry B. Joy, and Alvan Macauley

value. The increase in stock is for the purpose of providing additional treasury stock. The new increase gives the company \$13,000,000 of common stock. A modification in the By-Laws of the company has also been effected to create the office of Chairman of the Board, which is filled by Henry B. Joy, on his retirement as president. This change in titles of the officials does not change in any degree the manufacturing policy which has been in effect for over a year.

### DURANT BECOMES PRESIDENT OF GENERAL MOTORS

W. C. Durant, who organized the General Motors Co., and was exceedingly active in its early days, has recently been elected to the head of this company, taking the place of Charles W. Nash, resigned. Mr. Nash will continue his connection with the company in an advisory capacity until the end of the fiscal year of the company, August 1st.

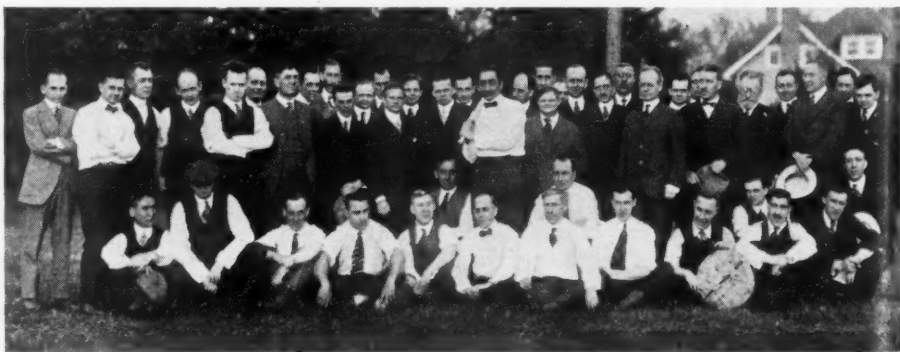
At the same meeting, Albert Strauss, of J. & W. Seligman Co., resigned as a director, and was succeeded by W. C. Leland, vice-president and general manager of the Cadillac Motor Car Co. He served a term on the Board in 1910.

A Russian buyer of commercial cars, S. O. Ochs, will be in this country in the early part of June for the purpose of purchasing trucks for Russia. His temporary address will be with the Gaston, Williams & Wigmore, Inc., 140 Broadway, New York City. He is anxious to meet American manufacturers and dealers, especially members of the commercial car and allied industries.

marked contrast to the results obtained when the Standard Oil Co. made a test of the gas several months ago. At that time the method of extracting gasoline from gas by passing the gas through naphtha was used, but the gas was found to be too dry.

The new process of passing the gas through oil causes the gas to bubble up through the oil, the latter being then sent to a steam still for the separation of the gasoline, and the absorbent oil being used over and over again.

Gas is passed through the absorbent oil at the high pressure of the line. The hot oil from the stills is cooled in a double pipe cooler or exchanger by the cold oil en route to the still and further cooled by passing through pipes upon which running water falls.



**A Few of the Pennsylvania Section of the Society of Automobile Engineers on Their Annual Outing**

On May 20th, the members of the Pennsylvania Section of the Society of Automobile Engineers enjoyed their first annual outing and good-fellowship meeting at Brown's Mills, N. J. The run was made from Philadelphia by automobiles decorated with S.A.E. flags. Boating, bowling, baseball and other sports were enjoyed, as well as a good dinner, and an evening run back to the city.



## SUBSTANTIAL GAINS IN AUTOMOBILE SHIPMENTS DURING MAY

Substantial gains in automobile shipments for the month of May were reported by the Traffic Committee, at a recent meeting of the N. A. C. C., the figures showing that more than 24,000 carloads were shipped, as against 15,392 carloads for the month of May last year. The shipping conditions have become more normal and makers are no longer obliged to use flat cars in shipping automobiles.

During the year the Traffic Department reported on 237,523 carloads of automobiles and sent 9523 notices to railroads in advance of the arrival of shipments, so as to insure prompt return of freight cars to manufacturing territory; an assistance to railroads, as well as to the automobile manufacturers.

## N. A. C. C. ELECTS OFFICERS

At a record gathering of automobile manufacturers in connection with the annual meeting of the National Automobile Chamber of Commerce, Inc., in New York, June 7 and 8, Charles Clifton, of the Pierce-Arrow Motor Car Co., was again elected president of the organization. The other officers elected are as follows:

Vice-president, Wilfred C. Leland (Cadillac); second vice-president, Hugh Chalmers (Chalmers), Gasoline Division; second vice-president, Windsor T. White (White), Commercial Vehicle Division; second vice-president, H. H. Rice (Waverley), Electric Vehicle Division; secretary, R. D. Chapin (Hudson); treasurer, George Pope; general manager, Alfred Reeves.

The commercial vehicle makers in the N. A. C. C. held a commercial vehicle convention at which many standards were adopted, furthering the plans for more efficient service to the buyers of trucks as well as of pleasure cars.

The commercial vehicle convention decided that no truck show was necessary at this time, although the usual successful pleasure car shows will be held in both New York and Chicago. They decided against any change in the standardization of frame widths at this time.

For the protection of buyers of trucks, a standard definition of motor truck chassis, both gasoline and electric, was decided upon and the convention, together with the annual meeting, approved a form of service policy which is expected to supply even better service to the car owner.

Almost all the 97 companies holding membership in the N. A. C. C. were represented at the meeting.

### Opposes Deferred-Payment Plan

The N. A. C. C. has instituted a broad campaign of education calling attention to the fact that widespread advertising of credit plans is detrimental to the industry, and that members of the Chamber be encouraged to avoid adopting policies which may undermine the business and that they be encouraged to pursue those policies which can alone maintain a permanent success.

## BRITISH RAILROADS FIND TRUCKS PROFITABLE AS FEEDERS

Nearly 500 motor vehicles were owned and operated last year by the principal steam railroads of the United Kingdom. The number was somewhat less than in 1914, owing to the requirements of the War Office, which requisitioned some of the vehicles for army purposes, taking, for example, 32 of the London and Northwestern's fleet of 52 omnibuses. It is expected, however, that this year will show a considerable increase.

The British railroads collectively possessed 223 motor buses last year and more than 250 trucks and vans for hauling parcels, baggage and freight. The largest fleet were as follows:

Railroad	Motor Buses	Motor Trucks
Great Western .....	109	95
London and North Western...	20	75
North Eastern .....	43	17
Midland .....	2	38
Great Northern of Scotland...	36	
London and South Western ..	2	27

The Midland doubled its fleet of trucks last year and the North Western increased its fleet 50 per cent. These road vehicles are used principally as connecting links between the main lines and towns located some distance back from the railroads.

There is a big opportunity for similar use of motor vehicles by the railroads and interurban electric lines in the United States for serving communities too small to make the construction and operation of branch roads profitable.

## LEFEVER ARMS COMPANY NOW DURSTON GEAR COMPANY, INC.

For several years the gear department of the Lefever Arms Co. has been so overtaxed that the company decided to concentrate all its efforts on that department. The assets of the gun department, with the exception of the factory and machinery, have been sold. The Durston Gear Co., Inc., has been incorporated under the statute of the State of New York, and on June 1st the corporate existence of the Lefever Arms Co., of Syracuse, N. Y., ceased. The management, ownership and financial responsibility of the Durston Gear Co., Inc., remains the same as that of the Lefever Arms Co.

## ELECTRIC STORAGE BATTERY INCREASES

Owing to the largely increased demand for its product the Electric Storage Battery Co. is now making enormous additions to its already large manufacturing plant. A tract of land extending from Eighteenth to Nineteenth Streets, and from Allegheny Avenue, a distance of 500 ft. to Westmoreland Street, Philadelphia, has been acquired and a 6-story addition is now under way. Other buildings will quickly follow. The company claims that the increase of business is due not to war orders or other sporadic conditions, but to a logical home demand.

## ELECTRIC VEHICLE SECTION CONVENTION A BIG SUCCESS

The 39th Convention of the National Electric Light Association, held May 22nd-26th, in Chicago, was successful beyond all expectations, and for real constructive work accomplished will be a high mark for succeeding conventions to strive for.

The Electric Vehicle Section made its debut at Chicago and for a newcomer collected unto itself a great deal of favorable recognition, which gave conclusive evidence that the Electric Vehicle Section would not only maintain an individuality, but would secure for the electric vehicle more favorable consideration than was formerly possible.

The Chicago Convention was attended by over 5,000 delegates; most of them were in one way or the other acquainted with the merits of the electric vehicle, and it is safe to predict that as a result of this knowledge, which has been conveyed to influential central station operators, that the electric vehicle enters a new and infinitely brighter era.

A very prominent feature of the electrical exhibition, held in the Auditorium Theater coincident with the Convention was the attractive and comprehensive exhibit of electric commercial and passenger vehicles displayed in the main foyer. Among those exhibiting were: The Anderson Electric Car Co., Beardsley Electric Co., General Vehicle Co., Milburn Wagon Co., Walker Vehicle Co. and Ward Motor Vehicle Co. As a result of the success which the electric vehicle exhibits enjoyed, it is expected that electric vehicles will play an even more prominent part in succeeding annual conventions.

The following officers were elected for the ensuing year: Chairman, E. S. Mansfield, Edison Elec. Illg. Co., of Boston, 39 Boylston St., Boston, Mass.; Vice Chairman, George B. Foster, Commonwealth Edison Co., 72 West Adams St., Chicago, Ill.; Treasurer, H. M. Edwards, The New York Edison Co., Irving Place & 15th St., New York City, and Secretary, A. Jackson Marshall, 29 West 39th St., New York City.

## MOTOR TRUCKS BLAMED FOR BAD ROADS

According to Chairman William D. Sohler, Commissioner Joseph W. Synan and Engineer Arthur Dean, of the Massachusetts Highway Commission, motor trucks are to blame for the bad state of the roads. The Commissioners made a tour of the State roads and were very much surprised at the bad condition of the roads. They claim that the only solution is another tax on the commercial cars; that overloading is responsible for most of the trouble on the heaviest of motor trucks. These trucks weigh from 4 to 6 tons, and when loaded with coal, iron, stone or some other heavy material, the total weight is increased to 12 or 13 tons. Chairman Sohler states that either the tax on the motor trucks must be increased or the tonnage reduced.

## Personal Items

**John K. Stewart**, president of the Stewart-Warner Speedometer Corp., died recently from a stroke of paralysis at the age of 46 years.

**John R. Eustis**, formerly editor of the motor truck department of the New York Evening Mail, has become advertising manager of the Chevrolet Motor Co. He has been delivering illustrated lectures covering motor trucks in warfare.

**Martin V. Kelly** well-known advertising agency of Cleveland, O., has bought out the entire business of Bromfield & Field, Inc., of New York City, and will operate a branch house at 171 Madison Avenue. Russell A. Field, treasurer of the Bromfield & Field concern, has become vice-president of the Martin V. Kelly Co.

**W. M. Nones** was recently elected president and treasurer of the Norma Co. of America, New York City. Prior to this, Mr. Nones was secretary-treasurer as well as general manager of the company, and in his new position he will continue to exercise the general management of the firm which has in five years grown from a small import business to a commanding position among the American manufacturers of ball, roller, thrust and combination bearings.

## New Truck Agencies

**C. H. Evans**, Gallion, O., has taken the agency for the Republic truck.

**Motor Truck Sales Co.**, 538 S. Los Angeles Street, Los Angeles, Cal., has taken the agency for the Rush delivery car.

**Mitchell White Co., Inc.**, 23 W. 62d Street, New York City, is now eastern distributor of Sullivan trucks. Del Sappenfield is sales manager.

**Morris, Russell & Co., Ltd.**, London, Eng., will handle the Swedish Crucible Steel Co.'s Olson convertible units for Ford cars in the British colonies.

**T. G. & G. W. Brown**, Detroit, Mich., have taken the agency for the Stewart truck and have opened a display and service station at 12th Street and Lafayette Boulevard, to be known as the Stewart Motor Sales Co.

**Vim Motor Truck Co.**, Philadelphia, Pa., announces the following new agencies: Akron Selle Co., Akron, O.; Threefoot Bros. Co., Meridian, Miss.; Harold G. Arnold, 1122 S. Olive Street, Los Angeles, Cal.; C. D. Clark, Torrington, Conn.; Arnold Bros., Bloomington, Ill.; Karl Winters, Salt Lake City, Utah, and Geo. O. Barnes and Wm. Beidler, Seattle, Wash. Extensive alterations have been made to their showrooms at 1530 Broadway.

**Packard Motor Co.** has received another repeat order from the United States Government, this order calling for 56 3-ton trucks for the army. The cost of these trucks to the Government will be \$186,425.

**A. R. Mosler & Co.**, manufacturers of Vesuvius, Superior and Spit Fire spark plugs, announce the 1916 edition of "Mosler on Spark Plugs," a spark plug reference book, listing all automobiles, both pleasure and commercial, tractors, motorcycles, etc. This book has been compiled with great care, and the listing takes in not only the style and type of plug best suited for individual engines, but also shows the various ignitions and devotes considerable space to the proposition of spark gaps. It is made up for the convenience of the jobber, dealer and car owner, and contains a mass of really valuable information. Sent free on request. Address A. R. Mosler & Co., Mount Vernon, N. Y.

## BELIEVES APPLICATION OF DIFFERENTIALLESS AXLE MISUNDERSTOOD

To the Editor:

Since the appearance of my article in the trade papers, "Are Differentials Necessary in Truck Axles?" and which appeared in the Commercial Car Journal, May 15th issue, page 17, many comments have reached me with regard to the abolition of the differential. There is evidently considerable misunderstanding in regard to my meaning and the summary was undoubtedly overlooked altogether, which reads as follows:

"After considering all the various points, it is well not to become too enthusiastic as the introduction of a blank differential on the face of it is so drastic that one must of necessity move with extreme caution."

While I do not wish to retrench from what I have said in one iota, I think that it is out of the question for anyone to take this type of drive to meet all conditions. For short wheelbase, wide track and trucks which have to maneuver a good percentage of their total running time it would be out of the question, but for 'bus work, army service work and for contractors' wagons it has decided advantages.

In going over the good points in my previous article, it might be well to mention the disadvantages which we have encountered in this drive through extended experimentation.

So far as we can see, the blank differential is best applied on solid tires.

Where pneumatics are used, proper inflation of the rear tires is absolutely essential—in other words, it is very necessary that not only should both tires be the same diameter but the pressure in each should be about the same. This of course might be looked upon as a disadvantage, but it has its good points as well.

Even with the conventional differential it is very necessary that these conditions exist if the maximum efficiency be realized.

In high-speed pleasure car work the car cannot be held as steady when running over rough roads. However, side skidding from braking is greatly minimized—in other words it is infinitely safer to apply the brakes on a greasy pavement with the blank differential than with a conventional one. This, of course, applies to 'bus work and heavy trucking as well, and gives one confidence in city driving, which is readily appreciated.

In all the correspondence, the only real objection brought against the blank differential is the probability of using unequal diameter of rear tires. This, of course, would be very objectionable, but does not apply in ordinary service as much as one would think.

In a good many instances, where tires on one side of the truck are worn off first, the truck is kept in operation until both sides go before making the change. This is very general practice.

It is well to remember that the best design is only a compromise, and this is no exception to the rule, but with so many things in its favor, we are very certain of a large following in this direction.

ARTHUR M. LAYCOCK,

Chief Engineer, Sheldon Axle & Spring Co.

**The Splitdorf Electrical Co.** recently announced a ten per cent. monthly bonus to all employees. Over 1,600 employees will be affected by the increase, which will amount to about \$150,000 a year.

The increase was given voluntarily on the part of the company. Both piece-workers and day-workers will receive the bonus.

## New Incorporations

**Brown Truck Co.**, Omaha, Neb., has re-organized under same name. J. W. Elwood and C. F. Betske owners.

**Auto Trailer Truck Co.**, Oakland, Cal., recently incorporated with a capital of \$100,000. Will erect large plant.

**Commercial Auto Wheel Co.**, Wilmington, Del., has incorporated with a capital of \$300,000 to manufacture auto wheels.

**Motor Truck Supply Co.**, Detroit, Mich., capitalized at \$10,000, has incorporated to sell trailers and motor truck supplies.

**Schafer Ball Bearing Co.**, New York City, has incorporated to deal in ball bearings, parts, etc. Capital \$100,000. M. Daly, 229 W. 87th Street, New York City.

**Bushford Truck Sales Co.**, Toledo, O., has been formed with a capital of \$25,000 by Jos. L. Skeldon, Thos. J. O'Connor, W. F. Ryan, Evelyn Carmichael and D. F. Sheldon.

**Odell One Ton Truck Attachment Co.**, Atlanta, Ga., has incorporated with a capital of \$10,000 to deal in and assemble motor vehicles. E. H. Spalding is interested.

**Roland L. Owen & Harry R. Graham**, who have been handling the General Motor trucks in Detroit for some time, have incorporated as the Owen & Graham Co. Edw. H. Webb, well known in automobile circles, has joined forces with them and will act as vice-president of the company. Mr. Owen is president and Mr. Graham secretary and treasurer.

**Bankers Commercial Corp.**, 14 Wall Street, New York City, has been organized by representative bankers of New York and Chicago for the purpose of handling commercial securities. One of the principal fields of action will be the financing of deferred payments on pleasure and commercial cars and their commodities. Don C. McCord, formerly manager of Harris Bros. Co., Detroit, has become general manager. The company is particularly interested in the truck end of the business.

## Trade Changes

**D. F. Poyer Co.**, Menominee, Mich., has changed its name to the Menominee Motor Truck Co.

**American Piston Ring Co.**, 2730 15th Avenue, Minneapolis, Minn., has changed its name to the Economy Piston Ring Co.

**George Irving Co.**, 548 W. 22d Street, New York City, has changed its name to the Hopkins Mfg. Co. of New York, Inc. Business will be continued as formerly.

**Covert Motor Vehicle Co.**, Lockport, N. Y., manufacturer of Covert transmissions, has changed its name to the Covert Gear Co., Inc.

**Amesbury Body Co.**, Amesbury, Mass., has increased its business by taking over the Hallander brick factory building on Carriage Avenue and Chestnut Street, thereby adding 25,000 sq. ft. of floor space.

**L. H. Gilmer Co.**, Tacony, Philadelphia, Pa., owing to its heavy increase in business in Detroit and vicinity and in order to give its customers advantage of taking up their requirements with the company direct, has found it necessary to terminate the agreement with the R. B. Ridgley Co., of Detroit, and has opened an office in Hayward Bldg., 965 Woodward Avenue. W. S. Lewis, western representative, will be in charge of this office.



## ENGLISH JOBBERS OF ACCESSORIES MAKING THIS COUNTRY THEIR HEADQUARTERS

Though most of the talk of manufacturers of motor cars, trucks and accessories in relation to the Great War, has had to do with the direct importation of American products in the European countries, a new angle on the situation, which augurs well for the future of the industry in foreign trade, is now developing. Some interesting data on this situation has been gathered by A. A. Meggett, President of the Swiss Magneto Co., Chicago.

"It is well known among those who do a foreign business in automobiles or accessories," said Mr. Meggett recently, "that before the war, most of the overseas trade, particularly that going to the Far East, Africa or other British possessions, was cleared through London. The British jobber used to have the idea that everything had to go to London, and from there be re-shipped to its ultimate destination.

"But now, war conditions have changed this, and the antiquated customs of years' standing have given way to a more flexible method of handling American exports, particularly in the motor line.

"The tariff of 33 1-3 per cent. on motor accessories declared by the British Government and the scarcity of bottoms available for shipping has made it almost impossible for London jobbers to continue in business.

"Realizing this situation, several of the largest English houses, jobbing motor accessories, have opened up offices in this country, chiefly in New York, where they are handling their large colonial business by direct shipment.

"On orders from two houses of this kind, now in New York, with whom we used to do business in London, we are shipping Swiss Magnetos direct to Australia, New Zealand, Borneo, Java, Hindustan, Malay Peninsula and South Africa, where before the war, these shipments were always made to London.

"From the trend of things at the present time, it seems to me that this transfer of British overseas trade to our own shores is indicative of a very healthy condition, which, after the war, is bound to greatly develop our foreign business particularly with the British Colonies."

## BEAVER DAM MALLEABLE IRON WORKS ORGANIZED

The Beaver Dam Malleable Iron Works, Beaver Dam, Wis., has recently been reorganized under the name of Western Malleable Co., with the following officers: Lawrence Fitch, president and treasurer; E. E. Smythe, vice-president and general manager; M. E. Jacobs, secretary, and A. W. Wilbrandt, assistant secretary. The plant consists of three separate and complete units enabling the company to divide the work according to the weights and nature of the castings. The company makes a specialty of automobile castings. All sales are handled at the Milwaukee office.

## CONTINENTAL TRUCK MANUFACTURING COMPANY BUILDING PLANT

The truck factory will be located on the south side of Belknap Street, adjoining the Soo Line Railway tracks to the west. The first unit of the new plant will be a building with a frontage of 200 ft. on Belknap Street and 80 ft. deep. Work will be started immediately and it will be rushed to completion as rapidly as possible so that the company will be in a position to get trucks on the market while the present great demand for commercial motor vehicles, stimulated by the war abroad, continues.

The Continental Truck Mfg. Co., of Superior, Wis., is capitalized at \$50,000. Its officers are: E. M. Anderson, president; Ben Eimon, vice-president; Dr. J. G. Barnsdale, secretary and treasurer. He is also an originator of the Continental truck, which was first introduced in 1912.

## STUDEBAKER HOLDS BRANCH MANAGERS' CONVENTION

More than fifty branch managers and assistant branch managers of the Studebaker Corp. attended the convention, which was held from Tuesday, June 6th, to Friday, June 9th, in Detroit. They came from all parts of the country, as far east as Boston and as far west as San Francisco. Daily meetings were held at the Studebaker factory, at which L. J. Ollier, vice-president and director of sales, presided. A. R. Erskine, president of the corporation, came over from South Bend to be present throughout the week. Talks by heads of the sales, service, engineering and production departments, along with inspection of the factories, completed the business sessions, which were followed by an entertainment.

*"Whenever I find a farmer arguin' against new and better roads, I make up my mind that he really don't need ANY. He's 'sot' as far as Success is concerned."*



## Mack Trucks and Trailers Haul Forty Tons of SKF Ball Bearings

The above illustration shows the new American factory of the SKF Ball Bearing Company, at Hartford, Conn.; also a fleet of Mack automobile trucks with trailers, which arrived from New York with a shipment of forty tons of SKF Swedish Crucible Steel Ball bearings. It is a further example of the universal use of automobile trucks for long-distance hauling, and the value of trailers. It also exemplifies the progressiveness of the SKF Company. This company is at present passing through the transitional period incident to changing from being a purely sales organization representing the parent factory of Sweden, to a manufacturing organization with a factory at Hartford.

## Do You Know That—

John T. Fetherston, of New York City, claims that \$2,500 was saved last winter by his efficient system of snow removal with motor plows and motor trucks.

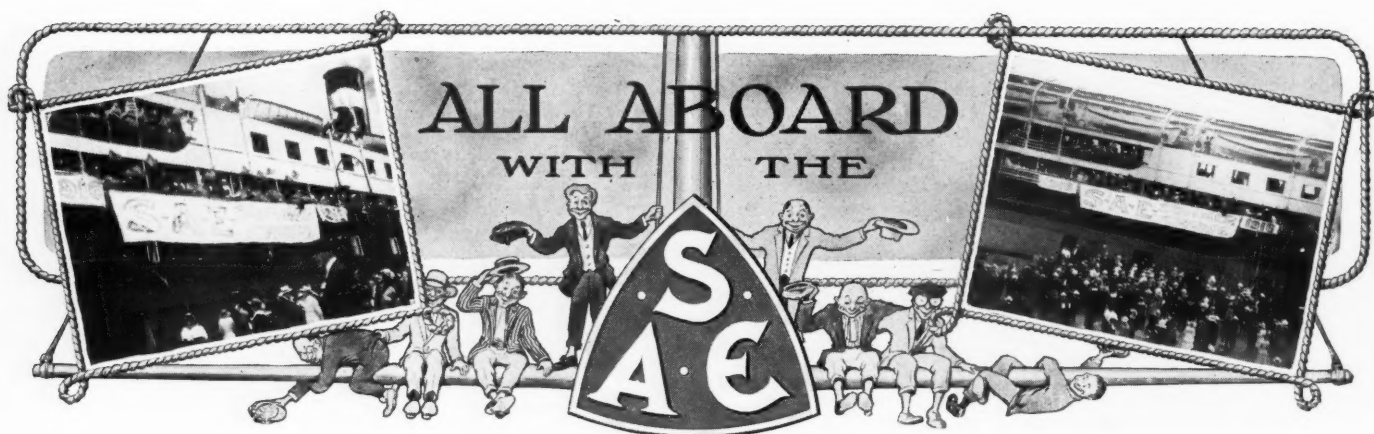
In Zanesville, O., gasoline for motor fire apparatus costs the city 25c. a week as against Chief Tanner's estimate of \$12 a day for feeding horses to do the same work.

The city council judiciary committee of Chicago has unanimously approved a bill providing that fenders be used on all motor trucks with a capacity of 1,500 lbs. or more. A series of tests will be made in the street and the fender found most efficient will be adopted.

Exports of commercial vehicles and horses since the beginning of the war amounted to about \$350,000,000. Of this sum \$160,000,000 was spent for horses and mules, of which \$130,000,000 was for horses and the remainder for mules. Of the \$160,000,000 represented in motor cars, about \$100,000,000 was spent for commercial vehicles and \$60,000,000 for passenger cars. France is the greatest consumer of the animals, 122,000 being estimated as the consumption of that country alone. England has taken 38,000 and Canada 77,000.

A Jeffery Quad saved the day for a street car company in Conneaut, O. The car tracks on State Street were torn up for improvements, and in consequence it was necessary for passengers to transfer, and for the car company to run extra streets cars at one end of the line to take care of the Memorial Day traffic. Horses tried, and failed to pull the street cars over the trackless block. The car company was in a quandary. A Jeffery truck, which was passing, was hitched to the street car and towed the car over to the tracks at the other end of the street without hesitation.

Essex Motor Truck Co. has recently been incorporated in Albany, N. Y., with a capitalization of \$600,000, for the purpose of producing a 1000-lb. truck, the chassis of which will retail at about \$750. The offices of the company are at present at 299 Madison Ave., New York City, pending the completion of the factory in Long Island City. John T. Ranier is president and treasurer, and Paul N. Lineberger, vice-president and secretary.



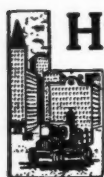
[ NOTE: We are appending herewith extracts of a few of the papers which were read before the members of the S. A. E. on their semi-annual meeting, June 12th to 16th. A complete review of the cruise will appear in our next issue. ]

## POSSIBILITIES OF THE CONSTANT-PRESSURE CYCLE

By ARTHUR B. BROWNE\* and HERBERT CHASE\*

**Abstract:** The authors first define the elementary conditions governing combustion efficiency, dividing these conditions into three main classes. They next compare engines operating on constant volume, constant temperature and constant pressure cycles, dealing specifically with the Otto, Diesel and semi-Diesel types.

The main part of the paper is devoted to an outline of the constant pressure cycle, analyzing its advantages as against the merits of the internal combustion cycle now in use. The paper is concluded with a detail description of a proposed constant pressure engine.



**H**AVE not engines designed to operate on the Otto or constant volume cycle reached a state of development such that but little further progress of moment is to be expected in the art of their construction, save perhaps in refinement of mechanical detail? Or to put the question in another form, are not the limitations of the Otto cycle as now applied, notably its poor thermal efficiency under the average low compression pressures realized in practice, such as to force the automobile engineer to consider carefully the possibilities of other cycles, if the art of motor-car construction is to progress as rapidly in the future as in the past?

These are fair questions and must in the opinion of the authors be answered in the affirmative. Having so concluded we have given much thought and study to the subject of this paper and have found it to embrace possibilities which we believe are certain to have far-reaching effects in the entire field of the engineering of internal combustion prime movers.

Before considering the possibilities of the constant pressure cycle it will be well to consider, for purposes of contrast and comparison, the advantages and disadvantages of engines operating on other cycles.

The thermal efficiency of any cycle is dependent in large part upon the conditions under which combustion takes place. Since these conditions vary greatly as between cycles it is most important to have clearly in mind, when making a comparison, the factors conducive to maximum combustion efficiency.

## Combustion Efficiency and Classification

The liberation of heat energy in a gas engine depends for its efficiency upon several conditions that may exist prior to ignition and during the combustion period. The efficiency is a maximum when the following conditions obtain:

- The density or compression of the charge is the greatest possible.
  - The temperature prior to ignition is the highest possible.
  - Oxygen is present in quantities just sufficient for complete combustion.
  - The admixture of fuel with the necessary oxygen is perfect, that is, when the charge is absolutely homogeneous.
  - Inert and diluting gases are absent.
- Combustion may be divided into three main classes.

In Class A all the oxygen is furnished by the supporting atmosphere without admixture prior to combustion. An illustration of this is the luminous gas flame, in which gas issuing from an orifice finally comes in contact with the oxygen of the air and burns with a luminous flame of low thermal efficiency. It will be noted that Class A fulfills none of the conditions previously enumerated as making for efficiency because: (a) Both gas and air are at atmospheric pressure; (b) The temperature prior to ignition is low; (c) Much more oxygen is present adjacent to the combustion zone than is necessary and this excess is heated without useful purpose; and (d) There is no intimacy of the mixture, the gas molecules being forced to "seek" their proportions of oxygen before combustion can occur. Hence in the luminous gas burner the gas is caused to issue in a thin sheet, whereby its surface is made as great as possible in proportion to its volume.

In Class B part of the oxygen is mixed with the fuel, the remainder being furnished by the supporting atmosphere. This class is illustrated by the Bunsen burner and its thermal efficiency is, obviously, far greater than that of Class A. In this case the first three conditions are not complied with, the increased efficiency being clearly due to a partial compliance with condition (d).

The change in efficiency obtainable as the other conditions are complied with is illustrated by the blowpipe, where the pressure on or density of the charge is increased and a marked increase in efficiency of combustion results, while with the superheating air coil sometimes used in connection with the blowpipe, the use of which tends to comply with condition (b), still higher efficiencies are obtained. It is prob-

able, however, that the combustion in the case of the blowpipe can be considered in some measure as falling under Class C.

In Class C fuel and air are mixed in such proportions that there is just sufficient and no excess of oxygen, so that combustion ensues without regard to the gaseous medium in which it takes place. This is sometimes called "flameless" combustion, from the fact that the combustion is so rapid and so thorough that it takes place by convulsive propagation between the molecules, in a very limited zone, almost a sheet, which is termed the "flame cap."

The term "surface combustion" is sometimes used interchangeably with "flameless combustion." In the opinion of the authors all combustion under Classes A and B is "surface" combustion; that is, the reactions take place only on the surface of the gas, when it meets the necessary oxygen.

Class C, however, embraces combustion within the mass—a true molecular interchange confined to the sheet of flame cap only because at that point alone the rate of propagation between the molecules exactly balances the rate of flow.

In the case of flameless combustion there is no dilution of the unburned gases by the burned. The mixture of gas and air approaches the flame cap, complete and instantaneous combustion takes place and the products of combustion move away. Thus the surface on which combustion takes place is the dividing point between burned and unburned gas. The process is orderly and efficient to the highest degree.

If a mixture of combustible gas and air in correct proportions is subjected to compression and heated prior to ignition the first four conditions (a, b, c and d) are present and combustion of the highest efficiency obtainable, in the presence of an inert gas, such as nitrogen, ensues.

## Comparison of Engine Cycles

Internal combustion engines may be classified as follows:

Class I.—Engines operating on constant volume cycle.

Class II.—Engines operating on constant temperature cycle.

Class III.—Engines operating on constant pressure cycle.

## The Otto Cycle

To the first class belong the Otto cycle, applied universally at the present time for internal-combustion automobile engines. Its chief advantages are its flexibility and

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†Chief Engineer, The Automobile Club of America, New York City.



adaptability to relatively lightweight and therefore to easily portable units. Its disadvantages are many and include the following:

(1) Poor thermal efficiency under the average condition of low compression pressure, which results from throttling of the charge and which (at maximum) must be relatively low to prevent self-ignition when a fuel rich in hydrogen (such as gasoline) is used.

(2) High explosion pressures occurring so suddenly as to deliver what practically amounts to a hammer blow on the piston head. To meet this condition the parts must be much stronger (and heavier) than they would otherwise need be to accommodate the relatively low mean effective pressure produced.

(3) Large clearance space required to admit of the low compression pressures necessary with rich and volatile petroleum fuels, which are practically the only fuels commercially available that will give reliable operation under varying load conditions. This clearance space is always filled with burnt gases, which dilute the incoming charge of unburnt gas.

(4) Impracticability (especially in light high-speed units) in cases where only heavy or relatively non-volatile fuels are available. This applies only to oil; that is, not to gas engines.

Combustion in the Otto cycle is superior by reason of its partial compliance with conditions (a, b, c and d) above. Combustion in this cycle clearly falls under Class C and would be highly efficient were it not for unavoidable losses and inherent limitations. But under the condition (a) we find the density of the charge is limited by liability to pre-ignition, and under (b) the same limitation is placed on the pre-ignition temperature; as to (c) and (d) it is to be noted that the proportions and intimate admixture of the fuel and air depend on the efficiency of the carbureting device used. This is never perfect and is usually far from ideal. From condition (e) it is evident that the presence of burned gases in the charge not only serve to lessen the unit weight of charge taken in but entails a direct loss because of the heat delivered to these products of combustion.

### The Constant-Temperature Cycle

No engines practicable for motor vehicles have ever been developed using this cycle (Class II). Engines operating on the Diesel cycle were originally intended to operate on a constant temperature cycle—in fact, the Diesel patents so stipulated. In practice, however, it was found that Diesel engines operate more nearly on the constant pressure than on the constant-temperature cycle.

### The Diesel Cycle

The Diesel cycle has several inherent advantages. High thermal efficiency, adaptability to use of heavy oils, variable cut-off (within certain limits) and high compression temperatures, making ignition devices unnecessary, are foremost among these. Its disadvantages, on the other hand, are quite as numerous and in some cases insurmountable where small light-weight units are required. These disadvantages have to do largely with the high pressures encountered and include the following: (1) High compression and explosion pressures making necessary heavy and close-fitting parts, difficult to keep tight (engine may become inoperative if not tight); (2) Necessity for high pressure fuel injection pump, and separate air compressor; (3) Mechanical difficulties in regulating the minute quantities

of fuel discharged by the pump to accommodate different loads; (4) Fuel admission line limited by the relatively small volume (entailed by the high compression necessary) to be heated by combustion; (5) Difficulties in starting with resultant complication; and (6) Low mechanical efficiency owing to close fitting parts (especially piston rings.)

The hot-bulb or so-called semi-Diesel engines possess most of the advantages of the Diesel type, although they are less efficient because of the lower compression pressure employed. They are limited as to power output per unit of weight on account of disadvantages similar to those of the Diesel cycle. This alone would preclude their adoption for motor vehicles.

### The Constant-Pressure Cycle

Let us now consider engines belonging to Class III. The advantages of this type are numerous and the disadvantages encountered in the past have had to do almost entirely with constructional difficulties. While the former have long been appreciated, not to say regarded as ideal, the latter have stood in the way of progress and have operated against the development of any commercially practicable\* engine applying the principle of this cycle—this excluding, of course, engines operating on the Diesel or semi-Diesel cycles as not, strictly speak-

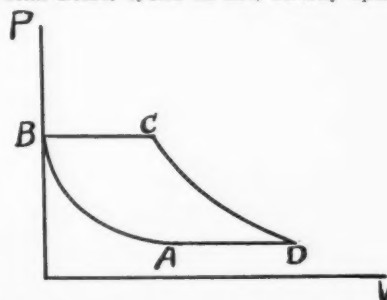


Fig. 1.—Theoretical Card for Constant-Pressure Cycle

ing, belonging to the constant pressure cycle class (see previous reference to Diesel cycle engines, under heading "Constant Temperature Cycle.")

In order to have in mind exactly what is meant by the constant pressure cycle let us first consider the succession of events. A theoretical card for this cycle is shown in Fig. 1, in which AB represents adiabatic compression from atmospheric to maximum pressure; BC, addition of heat isopiesticly; CD, adiabatic expansion from maximum pressure to atmospheric pressure; DA, cooling at atmospheric pressure. Note that heating is effected at constant pressure, and that this pressure is the maximum pressure of the cycle. There is no sudden rise in pressure at ignition as in the Otto cycle.

### ADVANTAGES OF THE CONSTANT-PRESSURE CYCLE

#### High Mean Effective Pressure With Low Maximum Pressure

(1) Inspection of the card given in Fig. 1 at once makes evident the two cardinal advantages of the cycle; (a) the large area indicating high mean effective pressure and (b) the low maximum pressure. In practice these are factors of utmost importance. They

\*Messrs. Carpenter and Diederichs state in their book on the Internal Combustion Engine that the Brayton oil engine was a thoroughly practical engine and saw wide application. This was true in its day, but the engine has long since been abandoned, partly because of its inefficiency as compared to the modern Diesel types, but more especially because of cumbersome design and failure of its inventor to grasp certain important details of construction that will be treated of later.

result in high and relatively uniform torque, large power output per unit of displacement and relatively low maximum bearing pressure and unit stresses on parts, with consequent light weight and length of life.

### Variable Cut-Off With Constant Compression Pressure

(2) The possibility of varying the point of cut-off is practically the same as that in the ordinary steam engine. The variation can be made through such a wide range that the engine accommodates itself to most if not all variation in load. This fact is of utmost importance, since it operates to make the cycle practically as efficient at part load as it is at full load. No corresponding variation to meet changes in load is possible in the Otto cycle unless with "hit or miss" governing, which of course is not feasible for motor-car engines. Variations in load are taken care of as a rule by throttling of the charge with consequent decrease in compression pressure. The thermal efficiency in any cycle falls rapidly with a decrease in compression pressure. In the automobile engine, for example, a maximum thermal efficiency of about 20 per cent. is obtainable under full load conditions; the thermal efficiency can fall as low as 2 or 3 per cent. under light load when the charge is throttled and the compression pressure correspondingly reduced. Since automobile engines run throttled during a large part of the time their thermal efficiency is necessarily low. Inspection of the card of the constant pressure cycle, Fig. 1, shows the feasibility of making the admission line BC so short (by means of an early cut-off) as to cause the expansion line CD to fall practically on the compression line AB. By this means it is probable that the lightest loads can be carried at the maximum pressure of the cycle with practically the same fuel efficiency as at full load. This being the case, throttling of the charge would take place only in starting.

### Adaptability to Use of Low-Grade Liquid Fuel

(3) The importance of this factor in view of the constantly advancing price of highly refined petroleum distillates is readily apparent. The method by which low grade fuel can be utilized will be outlined later. But engines of this type can be made to run on quite as heavy an oil as can be utilized in any Diesel engine and with far better combustion conditions than are possible in the Diesel type.

### Excellent Scavenging Properties

(4) The scavenging in a four-stroke constant volume engine is never complete because of the large clearance space required. This results in several drawbacks, among which is a loss in volumetric efficiency and a dilution of the incoming charge with inert gases. These faults are not present in constant pressure engines, because an excess of air can be forced through the cylinder while the piston is at or near the lower dead-center.

(5) Volumetric Efficiency. In the constant pressure engine using the working cylinder for a compressor, losses from decreased volumetric efficiency are precluded by the nature of the cycle. The air that may be normally pumped is in excess of the requirements of the working stroke on account of the subsequent expansion by heat. Hence there is always an excess of compressed air from which to draw on the working stroke.

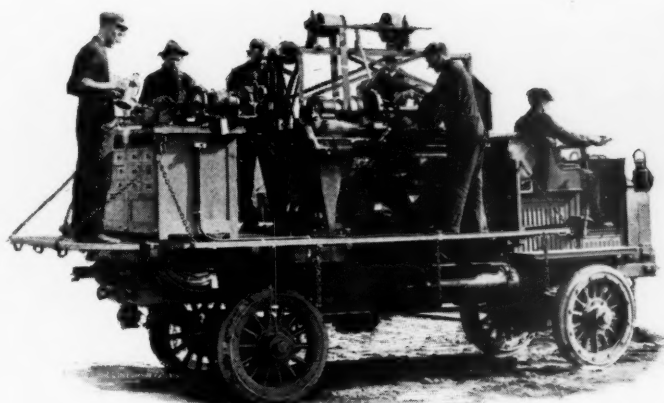
\* \* \*

### Low Operating Temperatures

(7) The specific heat of air at constant pressure is 0.2375, while at constant volume







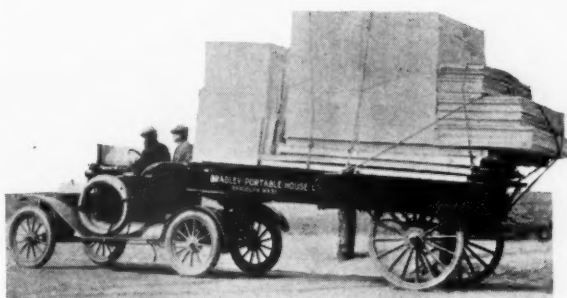
#### Four-Wheel Drive Repair Wagon in Government Service

The above illustration shows one of the 28 Four-Wheel Drive trucks which were recently sent to Mexico 31 hours after the order had been wired by the Government to the Four-Wheel Drive Auto Company, Clintonville, Wis. The repair truck is equipped with 13 inch lathe, 5 ft. bed; drill press, grinder, portable drill, cabinet bench, three vises, forge, three anvils, oxygen acetylene welding outfit, complete set of blacksmith's tools, complete set of machine bench tools, set of carpenter's tools. A 9 h.p., four-cylinder gasoline motor drives a dynamo, which furnishes power to the motors which operate the various machines and supplies the current for the electric lights. Oxygen and acetylene tanks are carried under the truck frame, leaving them accessible but economizing space.



#### Mack Tractor Serves Four Trailers

This Mack tractor hauls an eleven-ton milk trailer for the Sheffield Farms Slawson Decker Company, New York. This tractor operates with four trailers. Each trailer body is fitted with a twin elevating jack operated by hand on both sides, which raises the forward end of the trailer high enough to permit attaching and detaching of the tractor fifth-wheel connection. A spring attachment holds the elevating jack in place underneath the body when not in use. The trailer bodies are loaded and packed with ice while the tractor is engaged in hauling a load to a local distribution point. This provides for practically continuous operation of the tractor.



#### Carries a Load of Seven Houses and Fourteen Yards—Chicken Houses

The illustration on the left shows a Ford runabout hauling a semi trailer manufactured by the Martin Rocking Fifth Wheel Company, Springfield, Mass., loaded with seven portable chicken houses and fourteen yards. The load is more than one and a half tons. The outfit is used by a builder of portable houses in Boston, and is busy eighteen hours a day moving them from the factory to the summer resorts along the Massachusetts shore.



#### A Portable Clothing Store

If you live in a big city you can call on your clothing dealer and have him, if you so wish it, send several selections on approval; but, if you live anywhere within driving distance of Bangor, Maine, you can call Fred P. Ray and he will bring his whole stock to your door. For six years Mr. Ray has been catering to high-class trade in his territory, but has always been handicapped by the available means of transportation in his territory until a Chase motor truck representative solved the problem. The body is fitted with drawers of various sizes. The drawers are fitted with rollers so that they can be moved in and out with ease. The truck contains twenty-two drawers, the size of each being carefully worked out for the particular goods carried, as clothing, shoes, etc.

#### Tree Hauled Forty-Nine Miles

The practicability of commercial cars in solving difficult hauling problems for country estates, nurseries, etc., has led to a wider use of them among nurserymen. The illustration shows a tree 40 ft. high and 13 in. thick, being loaded by block and tackle onto a five-ton White truck. The tree was hauled forty-nine miles over the worst possible kind of roads, from a nursery near Chestnut Hill to Greenville, Del. The tree was lifted with a ball of earth encasing its roots, weighing approximately 8,470 lbs. The total load, including rigging, was 10,470 lbs.



## MOTOR TRUCKS HELP MOBILIZE 10,000 N. G. MEN IN 2 HOURS



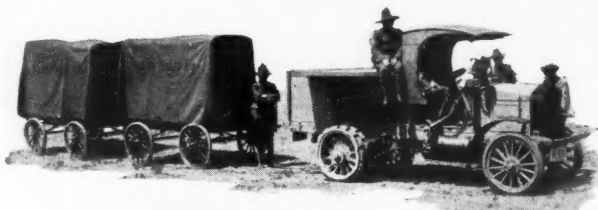
**Sham Battle  
on the  
Speedway Enclosure**

To demonstrate the capacity and serviceability of the commercial car in transporting troops in quick time to the front or from one city to another if necessity should require same, was the object of the recent maneuvers in New York staged by the National Guard at the Sheepshead Bay Motor Speedway.

Sixty trucks owned by New York merchants were loaned for the affair, besides a number of pleasure vehicles. These machines transported the men from the armies to the Speedway.

After the run a sham battle was held, the problem being the attack of a superior force on a smaller army covering the retreat of its main body. The coast artillery, Eighth and Ninth regiments, together with an armored battery, some engineers and signal corps men, defended one end of the en-

Attacking infantry advancing on the run.  
Note the two-ton Mack armored truck



**Christie Two-Wheel  
Front-Drive Tractor**

Showing the same attached to  
a wagon-type platform



**Pierce-Arrow Two-Ton  
Tractor**

This tractor is designed to tow twelve of the trailers as shown in the illustration. This tractor has a cruising radius of 670 miles, owing to its large gasoline tank. It carries two machine guns, which are mounted on top of the platform and can shoot over the top of the trailers.

**Sullivan Truck Used by the  
7th Regiment Armory**



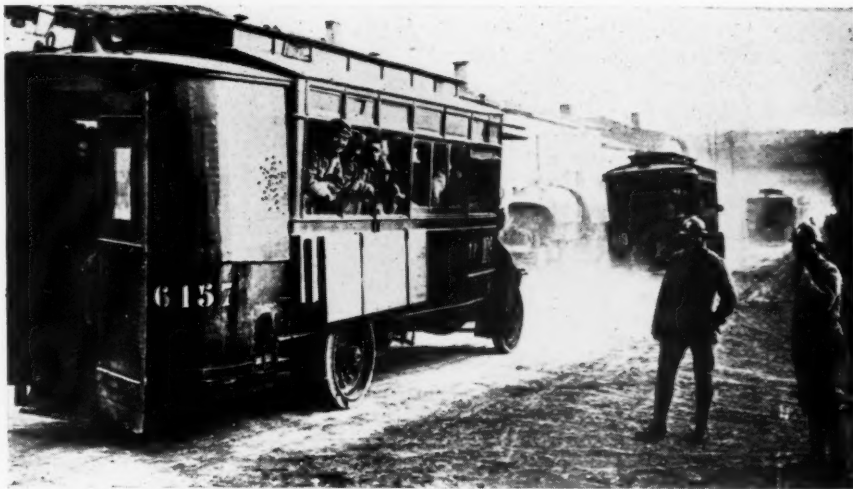
the war is contained in H. Warner Allen's report of the operations around Verdun. The "Autocar," London, Eng., quotes him as follows:

"Long before the assault on Verdun the French High Command was aware that the railway between Verdun and Ste. Ménéhould through the Argonne would, in case of an attack, be cut by the German heavy guns, and that it would need to be supplemented by a motor transport system. Early in February, therefore, a special commission was constituted for the region,

### **N. G. Enroute From Armories to Speedway**

The Drivers not being used to convoy formation, tried to pass each other, thus breaking the line.





#### With the French Army Before Verdun

At the attack on Verdun, troops were rapidly transferred by motors, whose services were mentioned in the day's orders by General Joffre

which had to arrange a service of 4,000 vehicles. All these had to be provided with great quantities of petrol, oil and grease. The general principle was for the Meuse railway to be restricted as far as possible to the transport of provisions, while the cars were to bring up men, ammunition and other material. The road to Verdun was reserved for motor traffic, and the traffic was regulated by a special body of men. For the mending of the road a considerable number of experienced roadmenders was detailed. For policing, the road was divided into sections, each in charge of an officer. At noon on February 22nd—the day after the battle began—this organization was first put to the test. Within four hours the road was free of all horse-drawn traffic, and has been so since. Every motor lorry carrying munitions covered an average of just 100 miles a day. Large numbers of troops were brought up without a hitch. An average of nearly 2,000 lorries passed each day in either direction. Not a little of the success is due to the roadmenders, who dashed in between the rapidly running lorries and worked like madmen for a few seconds when the road was clear."

vers, to obtain rifle practice, to get experience in handling camping and military equipment by motor trucks. Plans are being made for having an armored truck, as well as a transport train, to go on these week-end trips. Ten of the men will at-



tend at the company's expense the Plattsburg Camp. The officers of the company are: Captain, Lee J. Eastman, manager of the Packard Motor Car Co., Philadelphia; First Lieutenant, W. G. Brooks, sales manager, and Second Lieutenant, C. G.

#### PACKARD MILITARY RESERVES

Those in the automobile industry, and particularly in the truck end of the business, realize the important part which motor driven vehicles must play in case of war. One of the greatest weaknesses at the present time of the Government's handling of trucks is the lack of trained men to handle reserve corps or whatever units might be called into active service in case of actual hostilities.

In view of this lack of trained men, the Packard Co. of Philadelphia organized on the 1st of March, from the men in its own organization, what is known as the Packard Military Reserves, consisting of 100 men who are now drilling regularly once a week at Cooper Battalion Hall. They are being instructed at the present time in regular army maneuvers by officers of the United States Marine Corps. The men are uniformed in regular United States army khaki. It is proposed to have Saturday and Sunday trips for the purpose of accustoming the men to military maneu-

Culver, manager of the Technical Department.

It is not proposed to put these men into the field as a unit, but to offer them and their services as officers capable of taking charge of transport corps or trains.

#### BULGARIA ADOPTS MOTOR TRUCKS

According to figures compiled by a Bulgarian army officer, each motor truck which was recently put into service by his army has been doing the work of 500 oxen and 250 wagons each day.

The ox wagon is in charge of a driver, generally a man of advanced years. It carries an average load of 300 kilograms and moves at a speed of about 2½ miles an hour for eight hours each day.

The motor truck carries a crew of two, is able to transport 3,000 kilograms at an average speed of 15 miles an hour and runs sixteen hours a day if necessary. This means that each motor truck replaces, at a sixteen-hour run, 180 ox wagons, 360 animals and about 200 men. Considering that the motor truck, with a capacity of more than 3,000 kilograms, is by no means rare at the Macedonian front, and taking into consideration the length of the various lines of supply, the average for each truck is, the officer stated, 250 wagons, 500 animals and about 300 men.

These figures indicate that only about 120 motor trucks are necessary to permit the Bulgarian general staff to restore to the farms the 60,000 oxen which were "furloughed" some time ago. The change also liberated from military service, or made available for other branches, more than 30,000 men who had been drivers.

*"Some people seem to think that building th' right sort of a road is harder than Greek or Algebra. Nonsense. It doesn't start with knowin' how so much as WANTIN' TO. There's always somebody around with th' practical knowledge, but Initiative is a dern sight scarcer than cement."*



#### Goodyear "Kite" Balloon and Device for Raising and Lowering It

These air sentinels are used primarily for spotting artillery fire and for general observation. They are called the "eyes" of the army and navy. The Goodyear balloon is 81 ft. long and 22 ft. in diameter.

## Steel and Rubber Markets

### Speculative Steel Buying Being Discouraged

In order to prevent any overinflation of conditions in the steel market and thereby give added strength to the future situation, the mills are declining numerous orders from prospective buyers for delivery in 1917. The demand for domestic steel for delivery this year is less pressing, whereas foreign steel demand continues with unabated furor, tremendous war requirements and ordinary needs of other countries involving extensive tonnages of semi-finished and finished products. Quotations on June 10 were:

#### Steel Products Prices

Bessemer billets, per ton, mill.. 45 00 a .....  
Open hearth, per ton, mill ..... 42 00 a 43 00  
Steel bars, per ton ..... 42 00 a 43 00  
Forging billets, per ton, mill .. 69 00 a .....

The above prices are at tidewater, in carloads and larger lots. For quantities less than 2,000 lbs., but not under 1,000 lbs., \$2 per ton additional is charged, and less than 1,000 lbs., \$8 per ton additional.

#### Sheets

The following prices are for 100-bundle lots and over f.o.b. mill; smaller lots are \$2 per ton higher:

Blue Annealed Sheets— Cents per lb.  
Nos. 11 and 12 ..... 3.05 a 3.30  
Nos. 13 and 14 ..... 3.10 a 3.35  
Nos. 15 and 16 ..... 3.20 a 3.45

Box Annealed Sheets, Cold Rolled—  
Nos. 22 and 24 ..... 2.75 a 2.85  
Nos. 25 and 26 ..... 2.80 a 2.90  
No. 27 ..... 2.85 a 2.95

Galvanized Sheets of Black Sheet Gauge—  
Nos. 10 and 11 ..... 3.75 a 3.85  
No. 12 ..... 3.85 a 3.95  
Nos. 13 and 14 ..... 3.85 a 3.95  
Nos. 15 and 16 ..... 3.95 a 4.05  
Nos. 17 to 21 ..... 3.10 a 4.20  
Nos. 22 and 24 ..... 4.20 a 4.30  
Nos. 25 and 26 ..... 4.35 a 4.45  
No. 27 ..... 4.60 a 4.70

Above prices are for Bessemer stock. For open-hearth stock \$2 per ton advance is charged.

#### Iron and Steel at Pittsburgh

Bessemer iron, Valley furnace. 21 00 a 21 50  
Bessemer steel, f.o.b. Pittsb'gh 45 00 a .....  
Skelp, grooved steel ..... 2 35 a 2 45  
Sheared steel skelp ..... 2 45 a 2 50  
Skelp, grooved iron ..... 2 70 a 2 80  
Sheared iron skelp ..... 3 00 a 3 10  
Ferro-manganese (80 per cent. seaboard) ..... 175 00 a350 00  
Steel, melting scrap ..... 16 00 a 16 50  
Steel bars (contracts) ..... 2 75 a .....  
Black sheets, 28-gauge ..... 2 90 a 3 00  
Galvanized sheets, 28-gauge... 4 75 a 5 00  
Blue annealed, 10-gauge ..... 3 00 a 3 25  
Tank plates,  $\frac{3}{4}$  and heavier .. 3 75 a .....

#### Rubber Market Declines

Since our last report rubber has gradually declined in price. Large manufacturers are withholding of buying, awaiting further decreases. Quotations on June 10 were:

Para—Up-river, fine, per lb. .... 65 a ....  
Up-river, coarse ..... 47½a ....  
Island, fine ..... 59½a ....  
Island, coarse ..... 29½a ....  
Caucho, ball, upper ..... 50 a ....  
Caucho, ball, lower ..... 48 a ....  
Cameta ..... 34 a ....  
Ceylon—First latex, pale crepe .. a 65  
Brown crepe ..... a 62  
Smoked sheets ..... a 63½  
Centrals—Corinto ..... 47 a ....  
Esmeralda ..... 46 a ....  
Guayule ..... 42 a ....  
Balata sheets ..... 66 a 67  
Balata, block ..... 49 a 50  
Mexican—Scrap ..... 45 a ....  
Frontera ..... 46 a ....  
African, Massai, red ..... a ....

#### Domestic Scrap Rubber

Tires—Automobile ..... 5¾a 6  
Bicycle, pneumatic ..... 3½a 3¾  
Inner tubes, No. 1 ..... 25 a ....  
Inner tubes, No. 2 ..... 10½a 11  
Red ..... 11 a ....

Van Tassell & Kearney, for many years prominent in the horse and carriage trade, have devoted the 12th St. end of their building, 125-127-129 East 12th St., New York City, to the display and sale of the well known Brockway trucks. W. L. Van De Wiele, formerly of the International Motor Co. and the Garford Motor Truck Co., sales manager. This business will be conducted as a branch of the Brockway Motor Truck Co., of Cortland, N. Y., with Van Tassell & Kearney as branch managers.

## Activities of the Motor Truck Association of Philadelphia

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#### COMMERCIAL CAR JOURNAL OFFICIAL ORGAN

At the last monthly meeting, Lieut. Col. Geo. H. Penrose, commander of the Schuylkill Arsenal, urged the members of the Motor Truck Association to furnish him at the United States Army Quartermaster Department in Philadelphia, a complete list of the make, factory number, size and capacity of every commercial car sold in Philadelphia.

Interrupting him in his discourse, President Eastman, of the Association, told Col. Penrose that such information was already on file at the headquarters of the Association and that it would be furnished to the government when needed.

"That's just it!" continued the Colonel, "you have the information, but the War Department of the United States hasn't it and it is the War Department that will need the information should occasion arise and then it will be too late to go after it and classify it. That's the point; we want the information this week, this day, this hour—that's real preparedness.

"The day may come when the government may want to know the age, kind and capacity of each truck available for immediate use in case of need. The War Department will not ask it, but I suggest that all information regarding the trucks sold in this district be sent to me for classification.

When a car has been in use three years, I will withdraw the cards and it will not be many years before the government will have complete information of all trucks not over three years old available for use should occasion arise and the trucks could be withdrawn without seriously injuring the commercial purposes for which motor trucks are used. I will care for the information, index it and, possibly, just possibly, the War Department might use it."

President Eastman then promised to send the Colonel the data at the headquarters at once.

Several other men prominent in local army and naval affairs were also present and made strong pleas for preparedness.

Captain Robert Lee Russell, commandant of the League Island Navy Yard, said in part: "Preparedness consists of two things, efficiency and adequacy. The United States navy is efficient but not adequate. Philadelphia is showing a commendable spirit in its fight for preparedness. Just now the people of the country must be educated to preparedness. When the demand is insistent from all parts of the United States adequate preparedness will be secured. The local navy yard is admirably situated to become the premier naval base of the country, and I hope the next time a battleship is given out for construc-

tion that the League Island Navy Yard will get the contract."

"Strategy in war," said Col. Geo. A. Zinn, commander of the Engineering Corps of this district, "consists in getting to the scene first with the most men. It's up to you motor truck men. Motor trucks saved Paris from the Germans. If we can get a truck suitable for transporting machines and men we can do without horses and mules. We have to do without them anyhow, because the French and British have commandeered all the available horses and mules in this country."

Other military men who addressed the assemblage were Lieut. Col. Geo. Montgomery, commander of the Frankford Arsenal, who told of the making of arms and ammunition for the government; Capt. E. H. Durrell, of the U. S. S. Connecticut; Capt. C. B. Britton, commander of the U. S. S. Michigan, who explained the method of marksmanship used on battleships in long-distance target practice; Col. Allen, assigned by the War Department to develop the First Regiment of the National Guard of Pennsylvania, who appealed for recruits for this service.

E. B. Jackson, former President of the Association, also spoke along the lines of preparedness, who was followed by Judge Eugene C. Bonniwell.

The CCJ brings greatest returns to advertisers because of largest circulation among quantity buyers



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## HOTCHKISS DRIVE INCREASING ON TRUCKS



THERE was a time when it was considered very bad designing if any of the driving strain were taken through the springs. Today the practice is very rapidly growing of doing all driving through the springs. More flexibility is obtained and it is found that much better performance results where the rear axle is given a little freedom. This slight freedom of motion it has when it drives the car through the spring as a medium.

The Hotchkiss drive was introduced by the well-known French car makers of that name on its pleasure cars. This did away at once with all radius rods and with swiveled spring seats. The tendency of the axle itself to revolve in starting is taken up by the flexibility of the springs and relieves the entire mechanism of shock. With semi-elliptic springs the propulsive thrust is transmitted through the forward half of the spring, the front end of which is mounted without shackle directly to the frame.

The use of the Hotchkiss drive on trucks is a move toward simplicity, as well as greater efficiency, and undoubtedly will increase in use as an accepted standard of truck construction as time goes on.

The CCJ is the only truck publication a member of the Audit Bureau of Circulations. There's a reason!

## THE SECOND-HAND TRUCK PROBLEM



AS the truck industry grows older, the same problem which has confronted for several years the pleasure car industry, is now confronting the truck business, namely, that of the best method of disposing of second hand vehicles. The question of trading in on new vehicles the old ones has always been one of dispute between different sales organizations. Some claim that they can be entirely independent and never trade in any old vehicle, but it is very noticeable to those in the industry, and even to those on the outside, that very few are in that independent position, where they can say we will not take anything in trade.

As a general rule, trading in is the practice. Refusing to trade in is the exception to the rule. If the man who owns a truck is a better salesman than the truck salesman, the results are usually disastrous to the agency or dealer, who takes in trade a vehicle for more than it is worth and finds at the end of the year that, instead of making a profit, he has been doing business at a loss.

Some object to handling second hand vehicles and do not desire any of them on the floor with their new cars. This has led to the practice of operating a second hand department in a separate room or even going to the expense of operating a second hand store independently. This again has led to co-operative second hand sales department, operated by a number of different concerns. In some cities, auctions have been arranged at which the second hand cars have been knocked down to the highest bidder, arrangements being made by the different dealers to give a certain percentage of the sale price as a remuneration to the auctioneer. In the far West, even outdoor auctions have been held regularly. Some progressive dealers have tried to handle the problem by making a special deal with second hand car men in their immediate vicinity and the feeling is very universal among salesmen and dealers, not only in pleasure cars, but in trucks, that second hand vehicles are a detriment when on the floor with the new cars, and the business should, therefore, be conducted entirely by itself.

Ways and means of doing this to the best advantage are constantly under discussion, and for this reason we feel that matter pertaining to this subject, which will appear in the July issue of the COMMERCIAL CAR JOURNAL, will make that issue of particular interest to the dealers throughout the country.

If you have any solution of this problem in mind, we shall be very glad indeed to hear from you in the form of a communication on your business stationery. We trust that you will let us hear from you, and if, through us as a medium, any general solution of this problem can be worked out, we shall feel that we have been instrumental in advancing the general good of the motor truck industry.

*"When we was getting votes for a piece of road in Georgia one year, we ran up against an old codger, with a hump of unprogressiveness as big as a prize gourd. 'I don't believe in them there flossy roads, with everybody tearing past, running rough-shod over my young uns an' my chickens an' sich. Count ME out. Wouldn't give ye a dollar, ner a snitch uv moral support.' We put the road in just th' same and th' fourth day after it was opened to traffic I seen that old sour-belly zipping fer town on it, at forty miles an hour, in a brand new Ford."*

# CCJ GALLERY of SALES MANAGERS

DOC BUILT HIMSELF A MOTOR CAR TO TRY HIS ENGINE OUT. TO FIGURE ON THE COST TO RUN OR SOMEWHERE THERE ABOUT.

JUST AS HE GOT IT FINISHED IT SMELLED THE GASOLINE AND OFF IT WENT LIKE BLAZES THIS POWERFUL MACHINE.

THE COST TO RUN WAS VERY SMALL IT TAKES NO MAN OF MEANS. TO TRY TO STOP, IT JUST COST DOC FROM FOUR TO FORTY BEANS.

E GAVITUP

SAY DOC FOR THE LOVE OF MIKE BE REASONABLE I ALWAYS THOUGHT YOU WERE TIRELESS, NOW I KNOW IT

**J.W. WRIGHT**  
SALES MANAGER  
GOLDEN BELKNAP & SWARTZ CO.  
DETROIT MICH

**A.G. SAVELLI**  
FOREIGN SALES MANAGER  
WICHITA FALLS MOTOR CO.  
WICHITA FALLS, TEXAS.

I DON'T DEPEND ON SALES I BELIEVE IN HORSE POWER

HERE I AM

OH WILLYOU BE MINE

HIS IRRESISTIBLE ARGUMENT DOES IT

**E.M. McLEAN**  
SALES MANAGER  
O. ARMLEDER CO.  
CINCINNATI, OHIO.

0000H! MRS. SNAPPY! I AM SURPRISED TO SEE YOU SITTING ON THAT STRANGE MAN'S LAP

'BY JOVE' THAT WILL MAKE A GOOD TOPIC FOR A CIRCULAR WHEN A PERSON GETS HOLD OF SOMETHING HE LIES. IT TAKES A PRETTY GOOD ARGUMENT TO MAKE HIM LET GO

OH DADDY BOO HOO JUST CAUGHT A LITTLE BIRD WITH A PIN IN HIS TAIL

GEORGE SAYS - THERE IS NO HARM IN HARMONY

HIS DREAM

WONDER WHEN HE'S GOING TO EAT?

HIS MIDNIGHT LUNCH

**GEORGE M. DAVIS**  
SALES MANAGER  
THE STEWART MOTOR CORPORATION  
BUFFALO, N. Y.

**MOIE COOK**  
SALES MANAGER  
SERVICE MOTOR TRUCK CO.  
WABASH INDIANA

SORRY TO DECLINE BUT I HAVE THE BEST COOK IN THE WORLD AT HOME

COME DOWN TO THE HOTEL AND HAVE DINNER WITH US

WE'LL SELL SERVICE

IT'S A WINNER

HOORAY FOR COOK

HOORAY FOR COOKIES

A SOLID FOUNDATION SERVICE

THROUGH SERVICE HE ELECTRIFIES HIS DEALERS

**R. H. SPEAR**  
SALES MANAGER  
GRAMM-BERNSTEIN CO.  
LIMA, OHIO.

I WISH I HAD MORE HANDS

HE WROTE THESE SIXTEEN BOOKS

IS THIS WHAT YOU CALL SIXTEEN STORIES HIGH

SCIENTIFIC AUDITING

THE PRIME MOVER OF THE PERFECTLY REGULATED SELLING FORCE



# Why the Truck Salesman's Job is Sometimes Extremely Difficult

By W. LIVINGSTON LARNED



**H**OW do you send your produce to market?"

"I have six fine trucks and a stable full of good stock to pull 'em."

"How long a pull have you?"

"To New York from above Yonkers."

"Isn't that a mighty mean haul for a pair of horses?"

"Why? They are driven easy. Start in the cool of the morning, and take their time, you might say. I haven't had a horse die on me or one even ailing. The Vet' doesn't get fifty dollars of my money a year."

"You are not near enough to any of the railroad systems to utilize this type of transportation?"

"No. . . . Sort of out of the way for them, but I wouldn't use 'em if I COULD. They want it ALL. The way I work my stable, it's a darned sight cheaper and more reliable. I have tried sending some crate stuff by express. It didn't get the right handling in small lots and there were delays at both station-ends."

"Then it is NOT expeditious for you to use railroad transportation facilities?"

"I can say 'NO' honestly and mean it."

"How are the roads?"

"Good."

"Even in rainy weather?"

"Well . . . there are stretches where we have trouble; especially in Spring months and when there are long rains. But most of the roads are in fine condition most of the time."

"Returning to your farm for a minute . . . tell me . . . what sized place have you?"

"Medium. I'm not what you could call a BIG farmer . . . I'm not a monopoly or a Diversified Farm magnate or anything like that. But I've got a fine house, modern barns and silos, cement equipment throughout and powerful fine truck garden ground."

"New York market . . . entirely?"

"No. I hook up with the wholesale fellows in some of the surrounding towns."

"Then you truck continuously?"

"I've got six trucks always on the move, even at night time."

"Much of your stuff perishable?"

"In season . . . yes . . . a good portion of it."

"Isn't that long hot drive to New York, for instance, death to delicate greens . . . in July and August, let's say?"

"We get away with it."

"Have you ever considered putting in a battery of automobile trucks to take the place of the horse-haul?"

"I'm bothered to death all the time by folks talking auto trucks. But I wouldn't have 'em if you gave me a garage full."

"Isn't that rather radical talk for a man to put forth when automobile trucks have proven their worth . . . are proving it?"

"I'm speakin' from MY OWN viewpoint."

"Certainly . . . we grant that . . . but successful farmers all over the country are disposing of their stables and putting in horse-less trucks. Would they do it if it were not more economical . . . more efficient . . . more progressive?"

"It's a fad."

"You can scarcely call it that, can you, in the face of the yearly output of motor trucks and the steady, healthy increase of the NUMBER of them, one season over another. Look at the large department stores in our cities . . . in New York . . . one after another, these auto trucks are taking the place of the horse. Business, conducted on such aggressive scale, would scarcely adopt these methods 'just because it was a fad,' would it?"

"It's different . . . in town . . . people want that spool of cotton quick . . . there's lots of traffic . . . a horse gets banged about too much and the sidewalk pounds the feet off him."

"Doesn't the public demand garden truck with just as much celerity?"

"They get it."

"But farmers are adopting motor delivery. The South is ordering fleets of them . . . even with Florida sand and Georgia red clay, the auto truck is superseding the mule and the horse. Look at your great Western Land Owner . . . practically all his hauling, long and short, is now handled by automobiles. You can't possibly contradict the truth of this and the accompanying verification of efficiency. Isn't it rather stupid and unfair to hold out against FACT . . . uncontrovertible fact?"

"Everybody is welcome to their own opinion. I've got MY ideas. For ME, automobile trucks wouldn't be any good."

"Have you ever tried one?"

"No."

"Have you ever really investigated?"

"I can't say that I have."

"Have you permitted demonstrators to show you—to cite figures . . . to spread out the story and the tests?"

"I've never had time."

"Then you frankly admit you discourage these men when they come around and want to talk with you on the subject?"

"I haven't time to see them, I tell you."

*There is a Type of Farmer Who Does Not BELIEVE in Trucks. He Stubbornly Refuses to Listen to Agents and Special Salesmen Who Approach Him on the Subject. Here is a Faithful Account of an Interview With a Member of the Old School.*

"Would you spare time to talk with a man if he told you of a new fertilizer, minus phosphate, that would increase your acreage yield twenty-five per cent?"

"You can just better bet I would."

"Then WHY . . . why will you not listen to the auto truck representative . . . he has something concrete and tangible to set before you?"

"Oh, those auto fellows are all crooked."

"Another broad statement. Do you suppose an industry, in a few years, could grow to be THE largest in the world, if everybody connected with it was crooked?"

"I don't say they're ALL that way, but it's commonly understood that automobile salesmen are three-fourths gab and the last fourth cheek and unadulterated gaul. My back hair goes up at the very sight of one."

"All of which is irrelevant and beside the point. Let's settle down to an HONEST and dignified discussion of the subject. Automobile trucks are to be had of honest dealers. Automobile trucks are no longer in the experimental stage . . . they are a standard product, just as silos are standard or hickory wagons or knock-down houses. If you have never witnessed a demonstration . . . if you have never heard about actual tests, how can your opinion be valuable?"

"Oh, a man sort of senses those things where his own interests are concerned."

"Did you know that the service department of many truck houses will actually GIVE YOU A WRITTEN REPORT . . . tell you HOW many trucks you would need, their cost of operation, how much they would save mileage, consumption of gasoline or 'juice' and every last fine detail?"

"I haven't heard much about it. They'd obligate me to buy a truck if I asked them to do it."

"On the contrary . . . they would NOT. It is an important part of a great, educational campaign."

"There must be SOME hook in it . . . somewhere. Folks don't do things for nothing."

"The service is free and is done cheerfully. I know cases where the organization making out the report, actually recommended the purchase of OTHER trucks than their own. It never pays to deceive, in business."

"Well . . . trucks aren't reliable."

"They are as reliable as any form of mechanism. They will perform their duties as surely and as infallibly as a steam roller or a typewriter or an ensilage-cutter or a dummy-engine."

"A neighbor of mine had a small auto delivery truck. It was always out of order."

"There must have been some good and sufficient reason. Who drove it?"

"His son."

"Ever drive a car before?"

"No."

"Was he careful . . . did he understand . . . had he received specific instructions as to the care of the car?"

"Oh, I guess so . . . as much as anybody would. That truck was in the shop half the time."

"Can you believe that ALL automobile trucks are unreliable ALL of the time . . . that NONE of them are reliable?"

"Um—m—no, I wouldn't say THAT."

"There ARE perfectly dependable trucks on the market?"

"I guess there MUST be, of course."

"Then we'll weed out all the unreliable ones and talk only of the dependable brands, the trucks turned out by reliable factories. Are there any OTHER reasons why you are prejudiced against this form of haulage?"

"You got to learn to run the darn things."

"Naturally . . . but glance out on your streets and motor highways . . . almost everybody is running a car . . . knows how . . . learns quickly . . . see how many women are running their own cars . . . if a girl of seventeen can master a motor in three lessons and manipulate a big seven-passenger car through the congested traffic of lower New York and of Fifth Avenue, don't you think a hired man . . . a driver of horses, let's say . . . could learn to turn on power and guide with a wheel?"

"Yes, but . . ."

"But what?"

"Oh, nothing."

"All right . . . we'll take up another angle . . . this cost of housing and boarding horses . . . feed prices are on the rise?"

"Y.e.e.s."

"They've been going up rather steadily for some time, have they not?"

"I suppose so."

"And they are NOT apt to come down to normal again . . . ever . . . back to where they were before?"

"Maybe not."

"Doesn't that cause you some apprehension?"

"I'll raise much of my own feed."

"But even THAT costs you more, doesn't it?"

"Yes . . . yes."

"Then you're talking in a circle."

"Gasoline ain't showing any tendency to go lower. Charging batteries isn't the cheapest thing in the world. It's six of one and half dozen of the other."

"Gasoline prices MUST be ultimately adjusted. No other solution is possible . . . thinkable. The industry will scarcely cut its own throat by allowing forty-cent gas. But what I was coming to is this . . . do you have to feed your horses whether you are using them or not . . . through rain and too-heavy snow . . . sickness and all the other inevitable things?"

"What you trying to do . . . kid me? Of course a man has to feed his horses."

"You don't have to feed a car juice or gasoline except WHEN THEY ARE WORKING. War can't change the truth of that, can it?"

"Oh, automobile trucks need good roads . . . if there's a ditch or a bad streak, they wallow around like elephants."

"You just said your roads were excellent . . . even in bad weather."

"Still . . . something might happen to 'em."

"Automobiles are really responsible for the making of ideal roads . . . they made the good roads movement possible. Then there is the humanity side of it . . . in winter, those long hauls to New York are cruel . . . anyone who has ever watched a pair of horses in a blizzard MUST admit it."

"Yes, but we don't send 'em out much in winter . . . not when there has been heavy snows. Hauling is light."

"Ah . . . but you have to feed them during that period just the same . . . the expense of upkeep goes on JUST THE SAME."

"I . . . I suppose so. But what's the use of talking about it?"

"Summer heat is bad on horses . . . they are slow . . . they can't help it. After a certain number of miles, efficiency drops . . . you can register it as you would keep track of temperature, for instance."

"I don't seem to be having any trouble."

"Why not encourage some of the agents to show you . . . make them PROVE their assertions?"

"No, I won't have any d...d automobile trucks around my place I tell you."

"Is that final?"

"I said it, didn't I?"

## Buffalo's Direct From Commission House to Storekeeper Motor Delivery Service

By GEORGE W. GRUPP



THE West-Krantz Carting Co., of Buffalo, which operates five commercial cars whose capacities range from 1500 lbs. to 5 tons, makes a specialty of delivering produce of all kinds for the Buffalo Commission House Dealers to all points between Buffalo and Niagara Falls. This service the commission house dealers maintain is very much better than that which the railroad could give, because with this service all goods may be delivered direct from commission house to store. In the past this was impossible. Railroads could not be asked to do that. Then again in shipping by railroad the goods had to be first carted to freight house. Here they stood around until they had a full car. Then when the goods reached the Falls or intermediate points, in the afternoon, another handling was necessary. So by the time that the goods reached the storekeeper it was night. This condition of affairs would compel the storekeeper to wait until the next morning before he could market his wares.

All of this extra handling and delay in delivery has now been overcome. Motor trucks have solved the problem. At pres-

ent the West-Krantz Carting Co.'s trucks call at the various commission houses at 5 o'clock each morning and collect freight to be delivered at the various points between Buffalo and Niagara Falls. By 5.30 they are usually loaded and on their way. By 8.30 A. M. the last delivery has been made at the most distant points in Niagara Falls. This means that within a space of three hours after having left Buffalo fresh vegetables, etc., may be delivered from commission house to storekeeper. This also means that he can offer fresh goods to his customers. All of this would have been impossible by railroad.

At 1 P. M. each day these same trucks again leave Buffalo for the surrounding towns. Not only do these trucks carry produce, but also meats, poultry, butter, eggs, etc. They are the keenest rival of the railroads in that they only charge 23c to 25c a 100 lbs. for freight between Buffalo and Niagara Falls, a distance of twenty-three miles. The railroads charge the same. These freight rates are tremendously attractive to the commission house men, because for the same price they are able to give better and very much quicker service to their customers. This system is an ac-

tual saving of eight hours of time in delivery, and a saving of time and money in rehandling.

On each truck the West-Krantz people have a driver and one helper. To operate their 5-ton Standard to Niagara Falls twice each day it only costs them \$12.50.

A number of the commission house dealers such as Leon Brothers and M. & S. Produce Co., who operate trucks of their own, have what is called morning routes. The storekeeper orders his goods at night, and early the next morning the goods delivered to his door by one of their trucks.

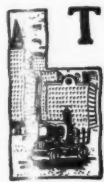
*"Florida built a beautiful new stretch of brick highway 'twixt Jacksonville and St. Augustine. It was all one fine, clean piece of road, with th' exception of a little break of a mile or so, where Politics was still in it. I guess, after all, Roads is built mostly by them as is more anxious for Road than Graft."*



## Moving the Country Into the City

Commercial Cars Bring Produce, Poultry and Milk to Kansas City Markets in Record Time; Greens Are in Better Shape; Farmers Get More Money for Their Goods

By W. D. MENG



**T**HE produce-supply district of Kansas City is being shoved back forty miles into the cheap-land areas, and not only one hour of daylight, but two and three, are being saved for the producers, by the acquisition of commercial cars.

Incidentally, the farmers are making more money, the people are getting their food supplies in fresher shape—and at reasonable prices for quality.

The advance in these respects during the past few years has been nothing short of amazing.

Take the instance of milk:

The Missouri Dairy Co. put a White 5-ton truck in service four years ago, gathering milk on a route extending 30 miles from Kansas City—and reduced the cost of delivery from 2½ cents to one cent a gallon. The milk was delivered in perfect condition at the city handling plant, at just the moment needed to send it out promptly on the city routes, with the minimum of handling.

Take live stock:

O. H. Shaw, with three 2-ton trucks, Reo, Oakland and Packard, has made much money feeding cattle and hogs on a 48-acre tract 14 miles from Kansas City, hauling the stock to market in the early morning, and hauling feed out. He uses only mill feed—which he can deliver to himself at a minimum cost; the cost would have been prohibitive, using railroad and teams. He would have lost 10 to 15 per cent. in the value of the stock, driving them in under the old custom. He would have always risked being late for the market. Now he is always on the job at the most advantageous hour, his stock in prime condition to bring the best prices—and feed for the highest prices. He saves more than the interest and cost of operating the trucks, in the delivery of mill feeds on the return trip. The extra service of the trucks

and the hauling of stock to market provide the velvet.

Take poultry and eggs:

H. O. Johnson lived 45 miles from Kansas City, where people marketed their poultry at Paola to dealers and commission men, who shipped to Kansas City commission men, who sold to dealers—those operations requiring six transportation items—to town, to train, to city, to commission man, to dealer, to consumer. Johnson bought a Ford truck, and brings poultry, which he buys from farmers at good prices, to Kansas City dealers, cutting the transportation items down to two.

Take truck:

Charles Ruterbusch has greenhouses at Leeds, Mo., nine miles out; with a Ford truck, seven acres of ground, he clears nearly \$3,000 a year. Truck gardeners near enough to town to handle their produce in as good condition with teams, take an hour more a day, out and in, pay \$200 to \$300 a year rent on nothing longer than a year's lease, and have to do with ground not 20 per cent. as productive.

Take "outside stuff"—potatoes, corn, etc. Farmers who can sell such production in competition at the market, use three days to gather and market a load, and get home, with teams, within 20 miles. With trucks, farmers carry twice as much, and use one day for the trip, saving a total of a day and a half a load, or three days a week—and can operate 10 to 20 miles farther out.

### Money Made in Hauling Milk

The subject of milk supply has agitated Kansas City and Jackson County to the extreme in the past three years. The city has imposed stringent regulations, and established grades, to be marked on bottles and indicated on the delivery wagons. Inspectors constantly watch the supply, to see that dealers maintain the quality. It has become imperative that dealers give the grades they say they do, that standards be maintained. It is imperative, there-

fore, that milk be delivered in the best possible condition.

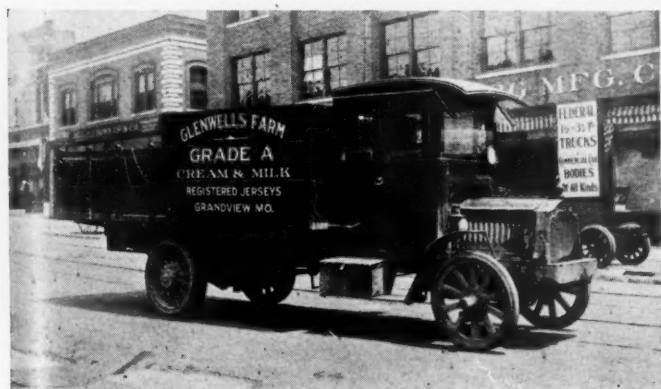
The Missouri Dairy Co., one of the largest companies, that handles perhaps the highest class of milk in Kansas City, has had experience that is illuminating. The company had previously brought most of its milk by train, transportation costing 2 cents a gallon to the railroad, and ½ cent a gallon from the depot to the plant. The company had to maintain icing stations at small towns, such costing \$2000 to \$3000 to install, and heavy maintenance. It went to trucks, and started to develop the dairy facilities of the immediate neighborhood. Three White trucks have been used in the past four years, each carrying 600 to 1200 gallons; and a 1500 lb. Dart truck, carrying 300 gallons. They tapped country in a radius of 30 miles. The trucks gathered milk on their routes, in the evening, milk of the morning and evening of that day; delivered it to the plant by nine o'clock; the milk was handled and put on local wagons by midnight, and delivered to grocers and customers, the oldest milk on the wagons being 24 hours.

The trucks were equipped with stake bodies, and carried ice. The milk cans were surrounded with cracked ice in the truck as they were gathered; and the milk reached the plant at a lower temperature than it was received from the dairymen.

"Territory could not be developed farther than 10 miles for team haul," said L. J. Chapman, manager of the Missouri Dairy Co. "One of our trucks has developed as far out as 35 miles."

But here is perhaps the most significant feature of this company's experience—it is about to abandon the use of trucks, except for hauling in the certified milk produced on the farms of the local millionaires who have very fine pure bred dairy stock. Why?

Smaller enterprising firms and men are now using trucks to gather the milk in competition, and outbid the Missouri



**A Familiar Sight on Kansas City Streets**  
This truck carries only milk from the Glenwells Farm



**H. O. Johnson and His Ford**  
With which he brings poultry raisers forty miles nearer Kansas City

The CCJ brings greatest returns to advertisers because of largest circulation among quantity buyers

Dairy. The big company has developed the industry of gathering milk in this wide radius adjacent to the city, and the others are taking up the business. These men, with less capital, cannot afford to enter the field of railroad transportation of milk, because of the expense of icing stations.

Mr. Chapman said recently that there was not a shadow of question on the efficiency of trucks for local gathering of milk.

"But if I were to go into that field permanently," he added, "I would build a garage close to my office, where I could watch the cars, and be sure that they were kept in tiptop condition. I know that at a charge of 2 cents a gallon, there is a big profit in hauling milk by trucks. The operating cost on one of these White trucks, for instance, that hauls a thousand gallons a day 30 miles, 10,000 pounds of milk, counting depreciation, is little more than \$10 a day."

### Drivers Buy Trucks

Because of the difficulty of securing men who would keep cars in best condition, the company adopted the policy of selling trucks to drivers, who then were paid 2 cents a gallon for the hauling of the milk. The men paid for the trucks in installments; and some of them have made good money, and now own their machines.

There are half a dozen high class dairies near Kansas City now, all furnishing Grade A milk, many of them receiving more than the usual market prices—and using trucks for quick transportation. Formerly, the team delivery required so long a time on the road, that inspectors too often found the milk in bad condition, with too high bacterial count.

### Farm Produce and Live Stock

Oscar Gamerlink, with a farm near Independence, Mo., nine miles from Kansas City, cleared \$6000 last year from 25 acres. The net profit was lamentably small in previous years, when with teams he had to suffer large waste in spoiled truck, depreciation in stock, and cost of horses. He bought a Model F Reo in the summer of 1915. He has made 8000 miles on his original United States 34 by 4½ tires, without a cent for repairs. He drives the truck. He uses about eight or ten gallons of gasoline a week, runs 500 miles on a gallon of oil. He comes to market every day; when he has no produce of his own to haul, he brings in cattle or hogs for his neighbors, putting up ordinary sideboards for the purpose. He pays the expenses of the truck, and sinking fund, out of the proceeds of such outside hauling. He handles four times the tonnage, at one-fourth the cost of hauling with two teams.

There are dozens of farmers in the Kansas City district who are doing this, or planning it. And to help the community learn the advantages of motor transportation, there are three or four transportation companies that are making money for themselves and the farmers, and getting produce in quicker and in better condition. For example, the Motor Transportation Co., the company which is also agent for Chase trucks, and uses these in its business. It has a route between Kansas City

and Independence, nine miles, making two trips a day with one 2-ton truck and one 3½-ton truck. Most of the carriage to Independence is to local merchants from Kansas City wholesalers; much of it is foodstuffs. To the small towns are carried many orders of farm produce—for, surprising to relate, the old custom of sending produce to the big city, and reshipping to the small town, still exists. The big cars pick up much produce on the return trips. Rates are about the same as on the railroad; 10 cents a hundred on straight loads, 25 cents minimum charge—the money made on the small deliveries. The truck provides convenient and ready delivery to market for many farmers in the district covered.

### Extending the Truck Area

Many truck gardens around Kansas City have been farmed for twenty and thirty years; and they are petering out. Let a truck gardener tell the story:

"There's lots of truck gardening now near Kansas City on land that the tenants pay \$20 and even \$30 an acre a year for. The soil is run down—for the tenants must rent from year to year, with the chance always that the owners will sell. These gardeners have been used to raising 'outside stuff,' potatoes, corn, etc. They are going broke at it. The wise ones are putting up greenhouses—but they don't dare spend much for manure and keeping up the soil, for they have no permanent ownership, and they can't compete with the man 10 or 15 miles away, who owns his little place, and maintains its soil. I know half a dozen men who have gone outside of the city, bought their places, installed trucks, and are making good money.

"The close-in gardener who tries raising outside stuff is up against a stiff competition. For the farmer out on land that he pays \$3 or \$4 an acre a year for, can skin him on prices, even when that farmer uses teams. Such a farmer gathers his truck one day, gets into market the next, and home the third day—with team. He can haul maybe \$10 worth of produce; and you can see how much he makes. There are a few farmers who go out to that cheap land, get trucks, carry two or three times the former amounts, get into market and out the same day, get better prices for their goods, haul at less actual operating cost, and save nearly half their time.

"This inside land is getting too expensive for farming. We must get farther and farther out. And unless a man is willing to rest content with \$2 a day as wages, he has to have a truck on such land. There isn't any doubt about it—that's the only possible development. The soil farther out is better, it is the only soil that will maintain the food supply with any profit to the farmer."

Let us return to Charles Ruterbusch. He went "farther out," and bought a Ford truck. He has seven acres, that cost \$800 an acre—he is a truck farmer. His team kicks up its heels in the pasture, being used chiefly in winter to haul manure. His investment totals about \$9000; but he feeds the horses less than half formerly, they will last longer, his truck costs him only a few cents a day, he brings \$15 to \$100

worth of produce to market three to six times a week, he has electric light and water, school nearby, a stream of jitneys by his door, clears nearly \$3000 a year, and could sell his land for a big advance over the purchase price.

R. D. Howe has undertaken a similar plan. Bought four acres outside the city, erected greenhouses, installed a Ford, spends five hours a day coming to market and returning, can therefore do practically all his work himself, has nearly all city advantages for his family.

Let us return to the example of H. O. Johnson, of Paola. He paid \$500 for his Ford truck, with a body built with shelves and wire netting, for poultry. He lives on a farm, but does no farming himself. He starts out whenever he pleases, gathers poultry from farmers, which he pays for on the spot; drives 45 miles to Kansas City, sells his load for from \$75 to \$150, on which he nets 10 to 15 per cent. after paying all expenses. He uses six gallons of gasoline on the round trip, paying 17.7 to 22 cents a gallon—usually the smaller sum. The people he buys from get more for their poultry; the dealers he sells to get it cheaper, and the customers also are favored. The poultry is in better shape than when it was carried and handled around through many hands.

### Saving Daylight

Kansas City is now agitating the setting forward of the clock an hour, to "save daylight." The purpose is to get business started earlier, so that the hour of daylight in the morning will be utilized, the hour now spent in bed or getting ready to go to work. So that there will be an hour more in the evening.

Motor trucks are saving far more than an hour a day for the farmers and truck gardeners around Kansas City already.

Formerly, gardeners within ten miles of Kansas City had to rise at midnight to get to market—and they had to toil till late evening, or hire other men to do the work. Now, these farmers get two hours more sleep, get to market earlier, and get back home in time and in physical condition to do much of their work themselves.

Farmers farther out—and those who, through the use of trucks, are able to rent or own cheaper land farther out—save not only an hour a day, but one day out of three, in marketing their produce. Instead of having half a day for outside work twice a week, they have three-quarters of a day three or four times a week. They save night work, too—they save time that is actual money, labor less, have more opportunity for recreation and improvement.

There is also time saved for the stock—a very important item. The horses on the place have daylight, and night-time periods of rest. The cattle and hogs do not have to be routed out for night marches to market, or for long tramps in the hot sun or bad weather. That time saved for the stock is actual hard cash, too.

### "Jitney Food Delivery" Fails

The transportation of food to Kansas City has suffered many changes the past three years, and is now, apparently, settling into its stride.



When the jitney craze hit the country, many 'buses and touring cars were put into service on the rural roads, bringing people to the street car lines. Some of these started out to carry produce also, and for awhile did a nice business along that line. But the passengers and food would not mix—the handling of express and freight was a different problem. There are a few transportation companies who "get away with it still," but they usually run a special truck for packages, and pick up odd packages merely as an accommodation, and incidentally, with their passenger 'buses or touring cars.

One company in Kansas City conceived the notion of making a business of bringing food products to a central market by motor truck. Its plan was to establish

chases, have their own automobiles in which the women come to market. And local grocers nearly all have their auto trucks for their own deliveries.

### Tipton-Kelly Truck

The motor truck has proved a godsend to the inland towns of the West. Previously, food products had a very difficult market; they were transported by wagon to the railroad towns, which process ate up a large share of the profits—so large a share that there was in fact a minimum of production. The chief industries from a farming standpoint were wheat raising, and such crops as could be marketed in bulk. Another serious situation was that in regard to the food supplies of the inland towns themselves. The cost of im-

porting was practically prohibitive when roads were bad, merchants did not prosper, and the people went without many articles of food that their better situated fellows in the railroad towns had. It was from such inland towns that the chief exodus to the city occurred. But the motor truck is changing all this; it is giving the inland towns the same advantages as are enjoyed by the railroad towns, and is paying a profit to the owners of the trucks.

J. F. Mergen and C. W. Bock, of Cawker City, Kans., have shown what a truck service can do for an inland town. Cawker City is on the railroad. Tipton, 14 miles away, had no railroad. Mergen & Bock bought a Kelly-Springfield truck in May,

1913—and it has had a chance to prove its service. It hauls fully its  $3\frac{1}{2}$  tons capacity every day, each way between Cawker City and Tipton—and it seldom misses one trip a day, usually many more. It carries supplies from the railroad to the grocers and merchants of Tipton; and carries back to the freight depot, the food production of the farmers, wheat, corn, potatoes, fruit, all kinds of produce, poultry, eggs, butter, even live stock. In the 36 months the total bill for repairs was \$282.20. The truck averages seven miles to a gallon of gasoline.

### Farmers Using Trailers

The Bradford Fruit Co. operating Kelly trucks from Joplin, Mo., to Webb City, Carthage, Cartersville, and small towns in that district, is another firm that is giving equal advantages to all American communities. It delivers chiefly fruits to the grocers and dealers of the small towns, from the wholesalers of Joplin. The food problem is often considered as being that of getting food products from the rural districts to the hungry thousands of the cities. These firms have proved that an equally important problem is providing the variety of foods—even the food itself—to the rural population, and the residents of the small towns.



Oscar Gamerlink With His Model F Reo

Using a truck boosted his profits fourfold. Last year he cleared \$6000 on his twenty-five acre farm

stations at the edge of town, where the farmers could deliver their produce, by wagon or truck, and where it could be collected by the company, to be delivered to its central station, or its various distributing stations over the city. This company found the plan impracticable, at least at this time. It is now receiving practically all its produce by freight, a little by wagon or truck delivered to its place by the producer; and it is selling without delivery, except deliveries made by parcel post and express.

Another company was organized on the strictly jitney plan, to handle produce. It established offices near the city market, with several small trucks to run on definite routes. Customers of retailers at the market had their purchases marked with name and address, and these packages were sent to the "jitney" office for delivery. This company also found the plan impracticable.

In both instances, the obstacle was "the efficiency of the truck in produce carriage." In the first case, farmers who had trucks and could profitably market their own goods, brought them clear into town, rather than stop at the edge. Some farmers even marketed only part of their goods to the commission men, establishing routes of their own to the grocers. Other farmers preferred to sell at the curb market, to retailers or customers. Other farmers found profit in loading their produce on transportation company trucks at their farms, consigned to commission merchants. As to the local delivery of retail purchases, the bevy of automobiles, trucks and passenger cars, at the city market from early morning till late at night is the answer. People who can afford to pay a few cents for the delivery of small pur-

chases, have their own automobiles in which the women come to market. And local grocers nearly all have their auto trucks for their own deliveries.

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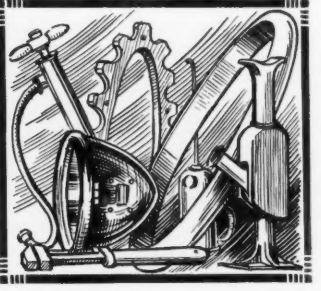


The Tipton Transportation Company's Kelly-Springfield Truck

This truck plies between Cawker City and Tipton, a distance of fourteen miles, hauling its full capacity, three and a half tons, each way. It has taken the place of the railroad between these towns



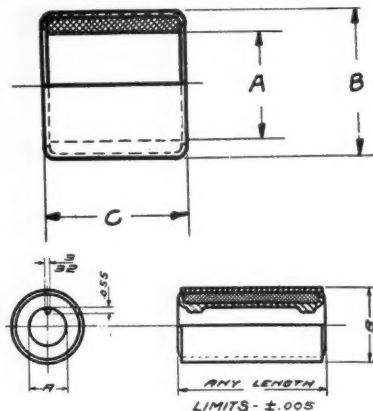
# TRUCK ACCESSORIES AND APPLIANCES



## O. AND S. BEARINGS ELIMINATE USE OF GREASE CUPS

Probably the most radical departure noted for some time in bushing construction is seen in the O. and S. Never-Oil self-lubricating bearings and bushings, made by the O. and S. Bearing Co., 526-34 Clay Avenue, Detroit, Mich. Primarily these bearings are for use in places where oscillating or slow moving parts are to be taken care of, such as spring eyes, tie rods, torque arms, brakes, steering gears, etc. The bearing may be briefly described as consisting of a compressed mineral fibrous lubricant that is confined between two steel shells, rendering under all conditions of service a perfectly lubricated dust proof bearing that is free from climatic influences.

These bearings have been adopted as standard part of the construction of some of the largest automobile and parts manufacturers in the country.



A LIMITS		B LIMITS	
+	.0005	+	.005 TO .008
-	.001		
A	B		
1/2	1		
3/16	1 1/8		
1/8	1 1/4		
1/16	1 3/8		

Sectional Views of the O. & S.  
Never-Oil Bearings

Upper view shows single member bushing for tie rods, torque arms, brakes and steering gears, while the lower view shows the double member bearing spring eyes and heavy-duty oscillation.

The double member bearing for use in spring eyes or heavy duty oscillation is assembled by press fit in the spring eye or retainer. The bolt is slotted to match the stamped keys on the inside of the bushing, which prevents slipping of the bolt. The shackles are drawn tight against the extension of the inner member, thus preventing end squeak, and assuring perfect oscillation of the entire bearing surface on the pre-lubricated fibrous material between the outer and inner members.

Tests have proven that almost without exception the bearing outwears the spring or part to which it is applied.

The single member Never-Oil Bearing or self-lubricating bushing is a steel shell lined with the pre-lubricated fibrous material. This bushing can replace any of the present metallic bushings, and is used in tie rods, brakes, steering gears and other oscillating or slow revolution parts of automobile construction in any dimension having not less than 3-32 in. wall. A test case was made recently by a large manufacturing concern, which reported that after subjecting the bearing to 3,500,000 oscillations, giving 165 half-turns per minute, with a carrying load of 600 lbs., the result showed no noticeable wear at all.

## THE VICTOR MOTOR VEHICLE GOVERNOR

This governor is of the constant motor speed type, which limits the engine speed directly through curtailing the gas flow, and is connected between the carburetor and the engine, and driven by means of flexible shafting connected to the timing-gears, camshaft, or magneto-shaft.

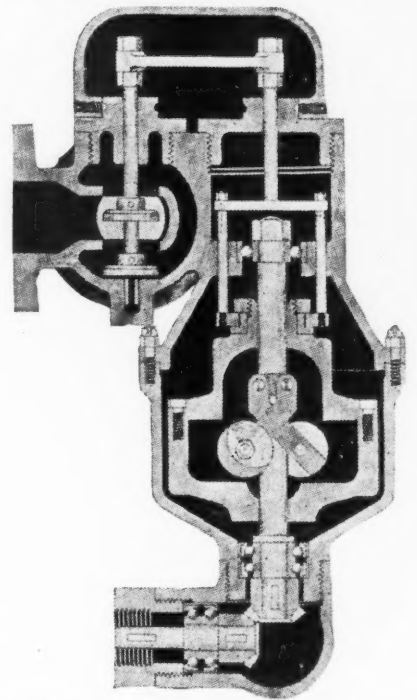
The governing element is patented, and is generally known as a static loaded centrifugal governor. By a static governor is meant that type of centrifugal governor which will maintain its revolving weights in a definite position for any given speed, and which is capable of resisting external influence which may tend to alter its position. The energy of the governor is the same value throughout its stroke as applied to the vertical movement. The speed regulating force is ample to move the valve and will give close regulation.

The construction of this governor may be readily understood from the accompanying illustration. The governor, valve and linkage are all mounted in a casing forming a complete unit, totally enclosed and may be locked and sealed, which makes it tamper proof, and a right angle drive may be had, also a right angle valve, which may be a convenience in connecting it to the engine, and which may be set at any angle, to lead to the point of application on the engine.

The double ported valve has been adopted on account of being perfectly balanced. The valve spool does not seat itself, but enters into the port like a plug in a hole, thereby making a balanced valve. The valve cuts off the gas supply in direct proportion to its movement, and as the governor travels its entire distance in about ten per cent. of its speed, the power of the engine is therefore not curtailed by the use

of this governor, but cuts off the gas supply at the proper speed and holds the engine at that speed.

The outer casing and valve body is made of aluminum, and ball bearings are used on the spindle and drive. The slip-collar is made of bronze, bearing on a steel collar and nut, insuring a long life. The inside weights are suspended from a trunnion



Sectional View of the Victor Governor

block which is neatly fitted on the spindle and locked with the same pins the weights are suspended from. The inside governor casing is driven by the friction due to resting on top of the revolving weights.

The operation of the governor is very simple. The governor spindle is driven by the engine, and spindle, weights and casing revolve together; the centrifugal force of the weights causes them to move outwards and upwards, raising the casing with it, which gives the lift of the governor.

An oil hole is provided in the upper governor chamber and if occasionally oiled will oil all parts of the governor needing oil.

The advantages claimed for this governor are that it provides a perfect control of the engine at maximum speed with or without load. At less than maximum speed it will allow the operator to handle the vehicle to suit himself without any interference from the governor. It is manufactured by the Victor Engineering Co., Allentown, Pa.

The CCJ has most advertisers because it gives them biggest returns



### J-M FIRE EXTINGUISHER

The J-M Fire Extinguisher, recently perfected and placed on the market by the H. W. Johns-Manville Co., is said to instantly extinguish any type of incipient blaze from any position.

This device is compact, handy, safe, sure in action and gives the operator a choice and freedom of operation.

It can be pumped and aimed simultaneously, or by a few seconds' easy pumping enough air pressure is developed to discharge the contents in a steady stream, reaching 30 ft. and always under your control at the nozzle lever. This feature enables the operator to use both hands to aim the stream, or to aim with one hand where necessity demands in cramped quarters.

Fires of any origin, including oil, grease, gasoline, kerosene and electric arc, on which other chemicals and water are often ineffective and dangerous, are instantly extinguished with the J-M Fire Extinguisher.

Another feature is that it is "Sealed for Safety." The unbroken seal at the nozzle indicates readiness for instant use—shows the contents are intact.

The list price of the J-M Fire Extinguisher is \$8, complete in nickel or brass finish with black enameled bracket, with screws for attaching to wall or automobile.

The J-M Fire Extinguisher Fluid for recharging is sold in cans retailing at \$1 in the United States and \$1.25 in Canada. This liquid is non-deteriorating and is the only liquid recommended for use and guaranteed for efficiency in the J-M Fire Extinguisher.

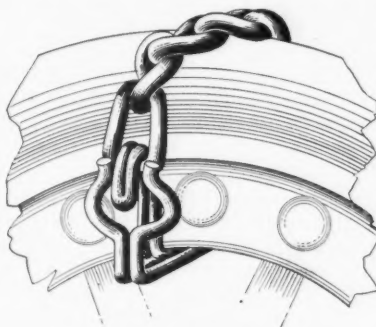
### MOGUL, GIANT AND TIGER TRUCK CHAINS

The accompanying illustrations show a line of truck chains made by the National Chain Tire Co., of Grand Rapids, Mich.

The Mogul Chain is made of a self-locking steel wire form, shaped to set over the felloe and on both sides. The wire form is made of special tempered steel, which will not bend.

The cross chain or connection is made with two special shaped links, one on each

end. These special links engage positively with each end of the self-locking steel form and allowing the device to travel freely over the surface of the tire. The chain can be put on and taken off easily with the hands, regardless of the position the wheel or the truck may be in, whether loaded or not loaded. This type is especially recommended for light trucks, and chain drive trucks, where the drive chains travel close to the wheels. Prices range from \$.70 to \$1.20 each, according to size.



The Mogul Truck Chain



The Giant Type



The Tiger

The Giant Truck Chain is made of a patented wire form spoke locking device. Extra heavy grade crucible steel is used for the form, which positively locks around the spoke. A large twist link soft chain is used for the cross chain, which is securely fastened to one end or side of the steel wire form.

The opposite side of this form is equipped with a simple adjustment clip, which engages with a slotted plate or fastener attached to the end of the cross chain that passes over the tire and is positively locked by means of a spring clip. This chain lists at \$7.50 to \$12.50 per dozen for single solid tires, and \$12 to \$18 per dozen for dual tires.

The Tiger Chain is made of a very simple patented steel felloe lock, and has

a special large twisted link cross chain, equipped with a special shaped link on each end.

The steel lock, made of tempered steel, is so constructed as to engage on each end of the cross chain. The cross chain can be removed and replaced when necessary, by using the hands only. Prices of the Tiger Chain range from \$7 to \$11.50 per doz. for single solid tires and \$11 to \$17 per doz. for dual solid tires.

### THE STAUDE GLARE STOPPER

Operators of delivery trucks, mail wagons, municipal apparatus, and commercial car owners, who have occasion to use their machines during the evening hours, doubtlessly realize the importance of avoiding collisions due to glaring or strong headlight on oncoming cars. The blinding glare from the headlights of interurban railway cars is also a source of annoyance to the truck driver.



The Staude Glare Stopper

To safeguard against collisions from these sources is the object of the Staude Glare Stopper. It consists of a heavy clear amber-colored crystal lens glass, 6 7/8 in. in diameter, which can be fastened to the windshield a little to the left of the driver. The nickel plated clamp part of this device is substantially made and permits fastening to windshield in any position. This glare stopper is made by the E. G. Staude Mfg. Co., Dept. C. J., 2675 West University Avenue, St. Paul, Minn., and lists at \$2.50.

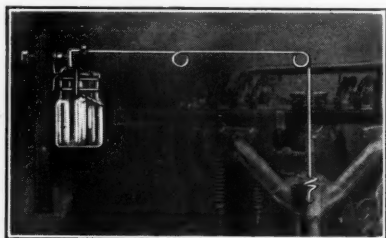
### NEW DEVICE FOR PRIMING AND CLEANING CYLINDER

A device for priming and cleaning engines, which sells for \$10, has been invented by E. A. Macdonald, former race driver and mechanic for the late Bob Burman, and is manufactured at the plant of the Adjustable Table Co., Mt. Vernon Ave., S. W., Grand Rapids, Mich.

It consists of two glass containers, interchangeable, controlled by a needle valve operated through a button on the front side of the dash, the containers being connected by a copper tube which is tapped into the manifold of the engine. The siphoning principle is used.

During cold weather the priming container is filled with a solution of a pint of

high-test gasoline and a half-ounce of commercial ether. As soon as the engine is stopped a press on the button releases a charge of this solution which is turned to hydro-carbon gas as soon as it strikes the hot cylinders. It remains in the cylinders until the engine is turned over and then ignites instantly. One charge is sufficient to start the engine even in the severest weather.



#### MacDonald Engine Primer and Cleaner

This device is for priming and cleaning engine cylinders. It is shown installed with all necessary connections.

For cleaning, the second container, filled with a solution of salt and water, is installed. When the charge strikes the hot firing chamber the salt oxidizes the light carbon dust and the water vaporizes and becomes superheated steam. This steam drives the oxidations and the debris before it to the exhaust.

No claim is made that the device will remove hard carbon, but once an engine is clean, it will always keep it clean. With its sticky exhaust valves, which are responsible for a majority of engine troubles, are unknown.

#### WISCONSIN TYPE T ENGINE ESPECIALLY DESIGNED FOR TRUCK USE

An interesting type of engine which is especially adapted for truck use is type T manufactured by the Wisconsin Motor Mfg. Co., of Milwaukee, Wis. It has four

cylinders, with a 4 in. bore and 6 in. stroke. The crankshaft is of chrome nickel steel, heat treated, having a tensile strength of 12,500 lbs. per sq. in. Bending stress is considerably decreased because of the four bearing crankshaft which makes all arms of same length of one-half the stroke. The engine is 3-point suspended and is bolted on a steel supporting arm which is stronger than an aluminum arm integral with the crankcase.

Extra large water jackets and centrifugal pump insure proper cooling under the severest conditions. The oiling system is Wisconsin standard force feed in which the oil is carried under pressure to all bearings. The oil pump, located in the sump, is entirely enclosed and submerged in oil, and therefore continually primed. It is easily removed for cleaning without disturbing the lower cover. A large oil strainer entirely surrounds the pump. The ball bearing fan is driven by a 1/2 in. V-belt. Special magneto coupling is flexible, allowing for easy adjustment of the magneto. Pistons and connecting-rods are all light weight.

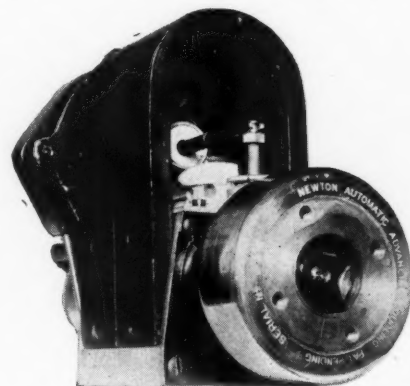
Inlet manifold is very direct without any dead pockets in the cylinders. The engine is arranged to take standard makes of two-unit starting and lighting equipment.

#### THE AUTOMATIC SPARK ADVANCING COUPLING

The Automatic Spark Advance Co., Monadnock Bldg., San Francisco, Cal., is manufacturing a device called the Newton Automatic Spark Advancing Coupling. It is a simple device which advances the spark of a gasoline or similar engine entirely automatically as the speed of the engine increases.

It is not necessary to have batteries or any form of dual ignition system with the use of this device for it is very easy to start a large engine directly on the magneto by a quarter turn; the magneto is so set that the circuit is broken at the point of

maximum inductance and it is not varied from this point at any speed. The timing is varied by the automatic coupling by allowing the spark to occur earlier or later in direct proportion to the engine speed without changing the relation of the magneto armature to the magneto pole pieces.

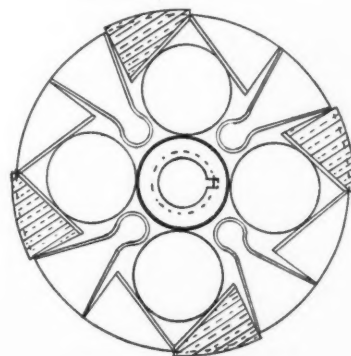


#### Spark Advancing Coupling Attached

This illustration shows the device attached to magneto. This coupling is flexible, and allows for misalignment.

In this way a very hot spark is obtained at low cranking speeds which also applies when the engine is running very slowly and heavily loaded; the magento gives a hot spark at the right time when most needed to give the maximum torque.

One of the most important features of the Newton Spark Advancing Coupling is the saving in fuel, which is said to amount to from 10 per cent. to 25 per cent. This



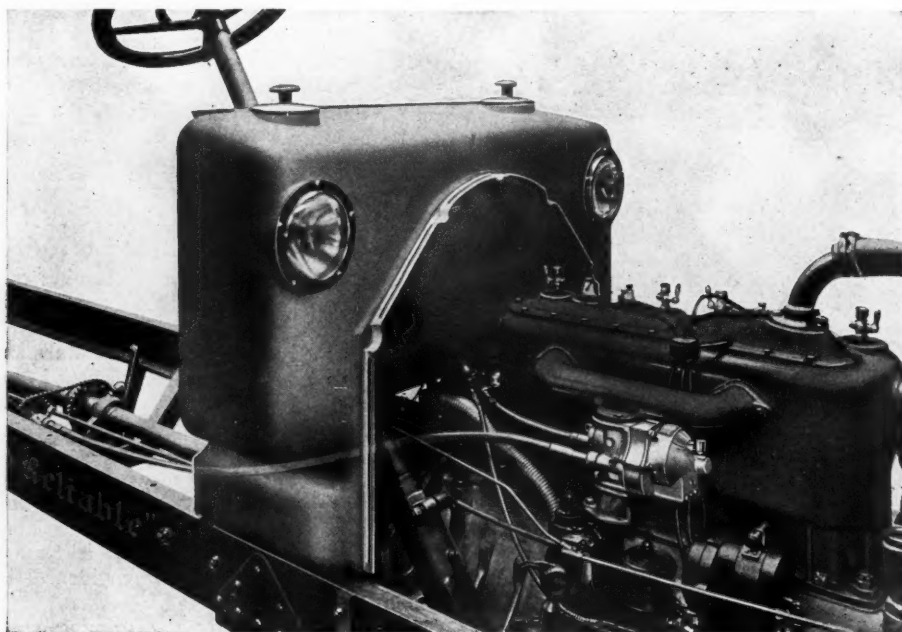
#### Drawing of the Interior

This sketch of the interior parts gives a fair idea of the operation of the device. The four circles represent the rollers, springs extending between them. The rollers and all wearing plates are case-hardened.

is claimed to be accomplished by the ignition taking place at the proper instant for all speeds of the engine, whether the engine is running slowly with fully retarded spark or running at highest speed with fully advanced spark. Further on account of obtaining the hottest spark at all times combustion is more complete and there will be practically no carbon deposit.

In any number of cases where the Newton Automatic Spark Advance has been installed, it has been found practical to start and run on distillate without any further changes, which was impossible before.

With the use of this device the engine will run considerably cooler because the spark is never retarded when it should be advanced.



View of the New Type T Wisconsin Truck Engine

The CCJ brings greatest returns to advertisers because of largest circulation among quantity buyers



The engine and bearings will have a much longer life for the spark is never advanced too far, thereby causing what is commonly known as a "spark knock," with its disastrous results.

One control lever is removed from the steering post, thereby leaving the operator's attention for driving, without having his mind on the spark control except to know that he is operating at the most efficient point of spark setting at all times.

It is impossible for dangerous backfires to occur when starting the engine, for the spark is always fully retarded when the engine stops running. With the design of the coupling it is impossible for the coupling to stick or become jammed by the use of heavy oil or wearing of notches, thereby leaving the spark advanced when the engine is stopped. The Newton Couplings do not use oil nor are there any delicate slots to wear.

This automatic advancing coupling is also a flexible coupling. The adoption of the advancing coupling, in nearly all cases, will not require any change in engine frame, magneto or magneto base. On account of its small size (1 3/8 x 3 in. diameter, approximately) it can be readily installed in place of the coupling between the pump and magneto on new machines or machines already in service. It also fits any standard magneto.

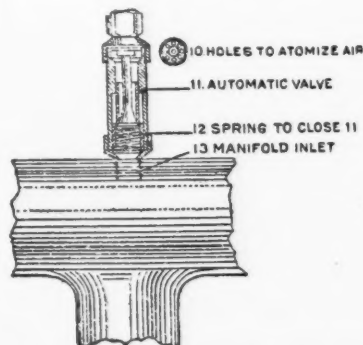
The wearing plates and rollers are case-hardened so that the coupling will wear little. A polished brass case entirely encloses the working parts which makes it absolutely foolproof.

This device has been tried out and adopted as standard equipment by some of the largest and most conservative manufacturers after many months of hard test.

#### AUTOMATIC GAS ECONOMIZER

The Auto Economy Co., 223 West Forty-Ninth Street, New York City, is offering the Automatic Gas Economizer. This device is cylindrical in shape and has a threaded end which forms the means of attachment to the intake manifold. As the name implies the economizer is intended to effect a material saving in gasoline. Concealed within the outer shell is an automatic valve backed by an air atomizer. It follows that under load or rapid acceleration the engine will draw more gas through the manifold and by so doing it will open the valve in the economizer and draw in extra air. The maker claims that the economizer may

be used as a medium for the removal of carbon deposits by injecting water into the top of the device. It is claimed addition-



#### The Automatic Gas Economizer

The cut shown herewith gives a cross-sectional view of the economizer. The irregular lines represent part of the intake manifold.

ally to reduce gas bills 15 to 40 per cent., increase power and act as an efficient primer. The Automatic Gas Economizer sells for \$3.

#### A FORTY-FIVE TON LOAD HAULED BY TRACTOR AT ONE CLIP

An interesting type of tractor known as the Bulkley-Rider Road Locomotive has been built by the Bulkley-Rider Tractor Corporation, of Los Angeles, Cal., for the Yuma Consolidated mines of Quartzsite, Ariz. The accompanying illustration shows this tractor making its first trip hauling 45 tons of freight from the harbor to the center of Los Angeles.

M. S. Bulkley became convinced more than three years ago that the motor tractor would be the evolution of the motor truck, that the detachable power plant would replace the commercial car for heavy duty work. With Wm. A. Rider, an Eastern engineer, he began work on a double reduction transmission to be attached to heavy duty trucks, thus enabling a 5-ton truck to pull a 10-ton load of trailers. This double reduction transmission is the foundation of the Bulkley-Rider tractor.

The tractor is powered with a 90 h.p. Wisconsin engine built by the Wisconsin Motor Mfg. Co., of Milwaukee, Wis.

The power is carried through the first transmission and the reduction transmis-

sion. There are six speeds forward and when reduced to the extreme low gear there is a total leverage of 96 to 1, and when running in the unreduced high gear the tractor has a speed of twenty m.p.h. This unreduced high gear is used when the engine is running empty.

#### Two Separate Sets of Springs

Easy riding and freedom from crystallization is secured by two separate sets of springs. This chassis is mounted on one set of springs, while the load-carrying springs are reserved exclusively for the weight of the load. Two plungers rigged in front of the load, carrying platform, prevent shocks and jars from the load, caused by rough roads.

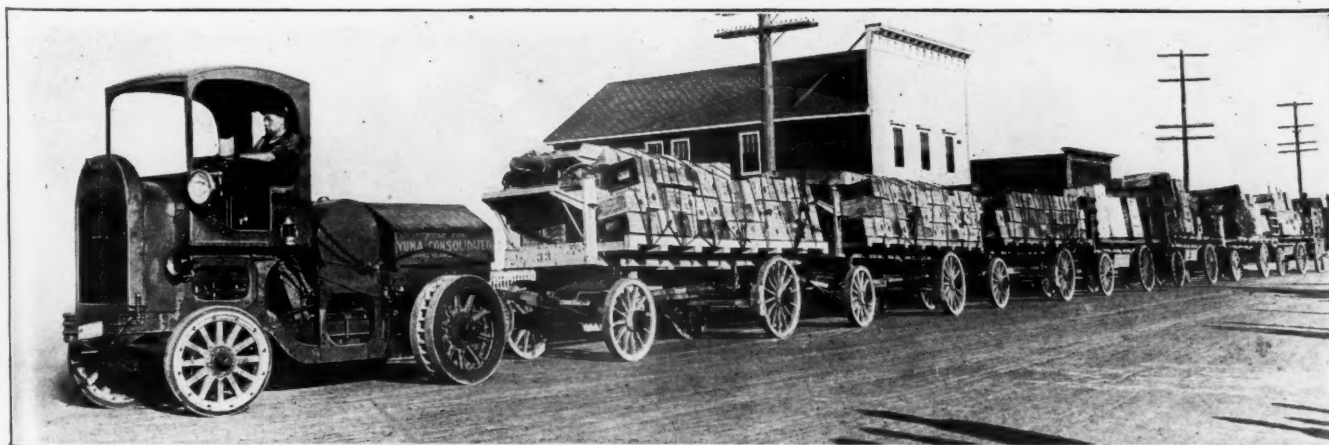
A feature of the tractor is the fact that the heavier the load the greater the traction secured for the drive wheels. The pay load is carried entirely on the load springs, and the entire weight is rigged over the drive wheels.

There is a powerful winch rigged on the tractor, which will pull a 28,000 lb. load at the rate of several feet per minute. With this winch and cable the tractor can pull itself up the steepest of banks and then pull the load up afterwards. It is the same principle as a powerful engine rigged to a powerful luff-tackle.

Another feature is the patented wheel. The wheels on the tractor used in hauling the forty-five ton load up from the harbor are equipped with center paddles, which take hold in sand, mud or loose dirt, giving traction under the most trying conditions. These paddle rims are interchangeable with solid rubber tires for use on boulevards, the paddle wheels being used on sandy desert roads.

While it is not used on the tractor built for the Yuma Consolidated the local concern has a patented device for the tractor whereby the road locomotive becomes a four-wheel drive engine by merely releasing a hydraulic jack which holds the auxiliary wheels off the ground when not in service. These auxiliary wheels are equipped with pedal pads, also patented by the local corporation which gives traction in the deepest sand or mud.

The full weight of the tractor is but 14,000 lbs.—less than a loaded five-ton truck. It is claimed that the new product is not destructive to highways on account of equal distribution of the weight.



**Bulkley-Rider Road Locomotive Hauling Forty-Five Ton Load**

The CCJ is the only truck publication a member of the Audit Bureau of Circulations. There's a reason!



## Federal Adds a Two-Ton Model

By LEN G. SHAW



**P**PROMPTED by the success scored by its 1½ and 3½-ton trucks, the Federal Motor Truck Co., of Detroit, Mich., has amplified its line with the addition of a 2-ton model.

While in a general way following the lines of the lighter truck, and in every respect conforming to established Federal engineering practices, the newcomer possesses points that make it worthy of detailed consideration.

The latest Federal is sturdy appearing, manifestly built for heavy duty, without rendering it cumbersome. While rated at 2 tons, it is in reality capable of carrying a generous overload without straining.

### Power Plant

Getting down to the mechanical details, and beginning with the power plant, in which compactness shares the honors with efficiency, it is found that the engine is a four-cylinder mono-bloc L-head type, with 4⅞ in. bore and 5¼ in. stroke, that develops full 30 h.p.

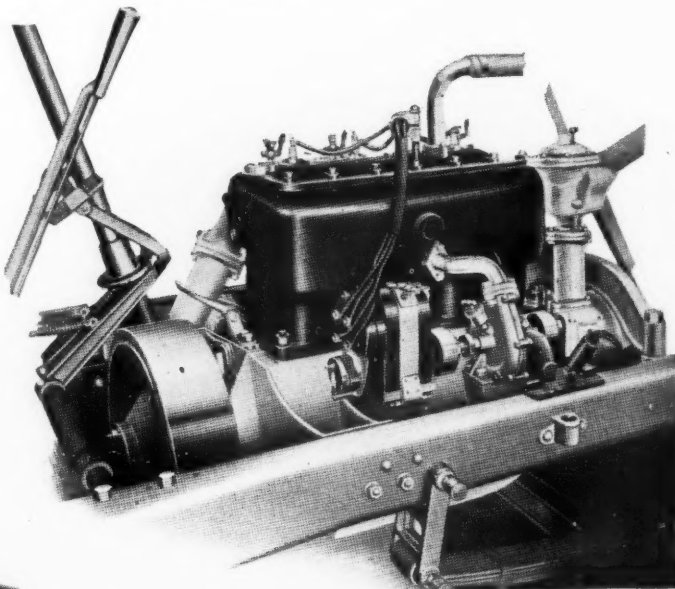
From the upper portion of the crankcase two feet extend to the side members of the frame to which they are bolted. The other point of suspension is at the forward end,

where the engine is supported on the cross frame member just back of the radiator. With the generous size of these feet, and the heavy bolts used in connection therewith, the engine is given secure anchorage, and at the same time rigidity is added to the frame.

Three large babbitt bearings, contained in bronze shells, carry the crankshaft, to

the rear end of which is attached the fly-wheel. A like number of plain babbitt bushings support the camshaft. The pistons are balanced with an accuracy that reduces vibration to a point where a remarkably smooth running motor results.

Valves are located on the left side, and while completely enclosed are readily accessible.



**Federal Power Plant**

Ignition by waterproof high-tension magneto; has four cylinders, 4⅞ in. bore and 5¼ in. stroke, developing full 30 h. p.



**The New Federal Two-Ton Truck**

Has optional wheelbase of 144 or 168 in.; optional tire equipment; cone clutch; selective sliding transmission; full-floating, worm-drive Timken rear axle, and semi-elliptic springs

The CCJ has most readers because it gives most information



A waterproof high tension magneto, at the right side of the engine, with fixed spark, takes care of the ignition problem. Gas control is by means of an accelerator only, the engine speed being regulated by a centrifugal governor and the pedal operated throttle. At 1030 r.p.m. of the crankshaft a speed of 13 m.p.h. is obtained with a gear ratio of  $8\frac{1}{2}:1$ .

#### Cooling by Pump

Following out the generally accepted practice among makers of heavy duty and consequently limited speed trucks, cooling, at least so far as the circulation is concerned, is by means of a pump located at the right of the engine and driven off the same shaft that actuates the magneto. The water jackets are of very liberal proportions, and the radiator possesses greater cooling surface than is usually found with power plants of this size.

A certain degree of novelty is disclosed by this radiator, which is in reality a three-piece member, consisting of a cellular core to which separate cast aluminum top and bottom are bolted. This provides requisite strength, and at the same time makes it very easy to disassemble the radiator to make repairs in case of accident. Rubber pads are located between the lower tank and frame cross members to take up the jar in this quarter.

#### Lubrication

Engine lubrication is by constant level pump circulated splash system that has for so long been an established factor in the Federal line.

#### Clutch and Transmission

Throughout the transmission the standard Federal practice prevails, with a resultant division of weight and strain that possesses merit.

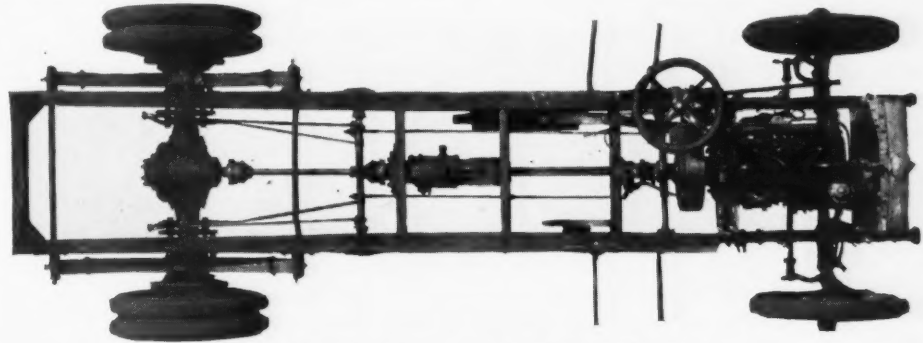
The clutch is a pressed steel leather-faced cone, 16 in. in diameter. The forward end of the clutch-shaft is carried by a self-lubricating bushing when free. Eight auxiliary springs underneath the leather give easy engagement, and longevity in this quarter is aided by the construction of the throwout, which is such that there is no thrust or wear on the roller except when the clutch is actually held out.

The next step is through cross-pin universal joints, in grease tight casings, and substantial shaft to the transmission, which

is compactly housed and mounted amidships on cross members of the frame. It is of conventional selective sliding spur gear type, with three speeds forward and one reverse. The nickel steel gear-shafts are carried on heavy duty roller bearings. One point advanced in support of this distribution of the transmission is that with a long wheelbase there is a freedom from whipping when coasting, the stress being materially reduced.

#### Rear Axle

From the transmission gearset final drive is by double universal jointed propeller shaft to the worm gear full-floating rear axle. The construction of this axle is



Top Chassis View of Federal Two-Tonner

Showing left side steering with central control levers, hinged radiator cap, well-braced frame, four-cylinder block engine, and gear set, which is located amidships

such that the worm gear is mounted with the differential as a unit, its housing constituting the cover of a massive axle housing. Timken roller bearings are used throughout the rear axle.

Axle shafts are of chrome nickel steel, heat treated. The inner ends are splined to fit the differential, and the outer ends have integral driving flanges which bolt direct to the hub flanges. The entire rear axle is of exceptionally rugged construction, and it is significant that even under the greatest stress trouble is unknown in this quarter. The worm gear ratio is  $8\frac{1}{2}:1$ .

#### Wheels and Brakes

The rear wheels carry the duplex expanding brakes, which are  $16 \times 3\frac{1}{4}$  in.—sufficient to hold under all conditions. The wheels are 36 in., wood, of S. A. E. standard. Tires are  $36 \times 4$  in. front,  $36 \times 6$  in. rear single standard, or  $36 \times 4$  in. rear dual solid, as desired. Tread at the front is  $58\frac{1}{4}$  in., at the rear 59 in. with the 6 in. single tires, or  $61\frac{3}{4}$  in. with the 4 in. dual tires.

#### Springs

Spring anchorage has been changed somewhat in the two-ton model, the shackles at both front and rear being carried on cross tubes under the frame instead of on brackets. The seats are integral with the axle. Springs are of vanadium steel, half-elliptic, the forward being  $2\frac{1}{4}$  in. wide and 40 in. long, the rear 3 in. wide and 54 in. long. Driving and braking torques of course are taken by the springs, but the position of the axle is controlled independently of the springs. This is accomplished by means of sturdy I-beam radius or push-rods that couple the axle casing directly to the side members of the frame. These

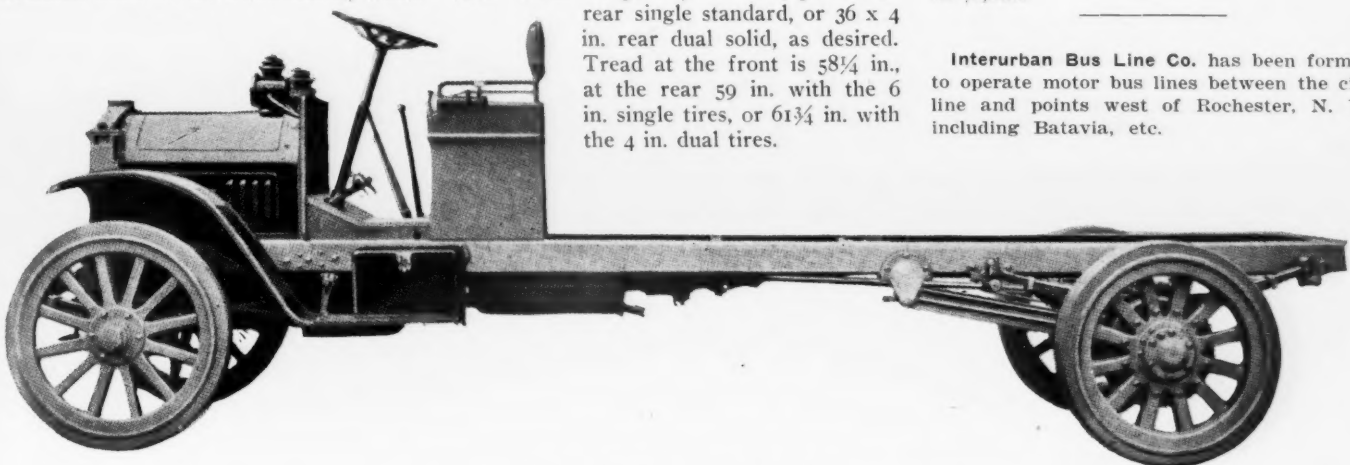
radius rods are provided at the rear end with ball joints, and under load are parallel with the ground. Adjustment is counted unnecessary because of the worm drive and the uniformity with which it delivers power to the wheels.

#### Frame

The frame is of pressed steel channel sections  $5\frac{1}{2}$  in. deep, with the side rails slightly narrowed in front. Five cross members, together with the fact that the rear cross member has integral gussets, insure plenty of strength.

The two-ton Federal is furnished with choice of wheelbase, Model O having 144 in. and Model P, 168 in. The loading space from the back of the seat to the end of the frame on the former is  $112\frac{1}{4}$  in., of the latter  $136\frac{1}{4}$  in. Either chassis, with driver's seat and standard equipment, comes at \$2,100.

Interurban Bus Line Co. has been formed to operate motor bus lines between the city line and points west of Rochester, N. Y., including Batavia, etc.



Federal Two-Ton Chassis

Side view, showing artillery wheels and general features, which follow in a general way those of the one and a half ton model

The CCJ has most advertisers because it gives them biggest returns

## Acason Trucks in Five Sizes

By LEN G. SHAW



**T**HE Acason Motor Truck Co., Detroit, Mich., is marketing as its leaders the 3½-ton and 2-ton models that have given such good account of themselves in the past. Supplementing these are the 1-ton and 5-ton chassis, so that the entire range of requirements is covered. The principal variation in the several models is occasioned by providing for less load and more speed, or vice versa, as the case may be. For the purpose of mechanical dissection, therefore, the 3½-ton chassis is selected, this being a typical representative of the entire line.

The Acason is largely a combination of American and European engineering practices. As a result, while devoid of revolutionary features, it incorporates principles that augur well for stability and freedom from trouble.

Certain distinguishing points are encountered, these having to do chiefly with accessibility and reduction in the number of parts. There is, for example, a three-piece hood, of 20-gage sheet steel. No hinges are used, the side panels being held firmly in place by large latches. When unlatched these panels can be set aside, giving free access to the engine without molesting the top piece, which can be quickly lifted off if desired.

Reduction of parts has been effected in connection with the rear axle and springs, all driving and twisting strain being taken by the latter, which does away with radius rods.

### Power Plant

The power plant has as its chief unit a four-cylinder engine conservatively rated at 32 h.p. at 1000 r.p.m. and 36 h.p. at 1200, with a speed of 14 m.p.h. This guards against the necessity of racing the engine to gain the requisite speed, a contingency that is further obviated by the introduction of a fly ball type adjustable governor, located on the front end of the gear case.

Cylinders are cast in pairs, and the engine bore and stroke is 4¼ and 5¾ in. respectively. As a means of comparison, some of the principal dimensions are cited: Front main bearing, 2 x 2 7-16 in.; center, 2 x 3¼; rear, 2 x 4; connecting-rod bearing, 2 x 2½ in.; piston pin bearing, 1¼ x 2½ in.; camshaft diameter, 1¼ in.; timing

gear helical width, 1 in.; timing gear helical pitch, 10; crankshaft gear end diameter, 1¼ in.; crankshaft rear end diameter, 1¼ in.; valve diameter clear, 2 in.

The crankshaft is of chrome nickel steel, heat treated, with a tensile strength of 140,000 lbs., and an elastic limit of 118,000 lbs.

### Lubrication

Lubrication is by constant level automatic splash, with a surplus reservoir from which a circulating pump draws oil through a



**Front of Acason Three and a Half Ton Model**

Showing radiator and unusually heavy steering knuckles, parts, etc.

screen and forces it, under pressure, through a duct that discharges the oil into the gear case and into each of the pockets into which the connecting-rods dip. The scoop of each connecting-rod has the same capacity for discharging the oil out of the pocket that the pump has to put it in. As the connecting-rods dip and the pump

forces in proportion to the speed of the engine there is a constant level wash of all parts on the inside of the engine.

### Ignition and Cooling

Ignition is through a high tension magneto, with variable spark, the magneto being located on the right of the engine, the opposite side from the inlet and exhaust manifolds and valves. It is driven off the same shaft that actuates the water pump.

Cooling has been worked out with due regard for truck requirements and limitations. The radiator is of cast tank type, bolted together so that it can easily be taken apart and cleaned. It has a 4 in. core. Instead of being anchored at the sides the radiator is mounted on the coiled springs under the bottom tank, this relieving it of twisting strain from the frame. The bronze centrifugal pump insures a constant flow through the water jackets, while a belt-driven cast aluminum fan assists in cooling.

### Three-Point Suspension

Suspension is three-point, but a variation from the more common practice is noted. At the forward end the engine, instead of resting on the cross member of the frame or a supporting bracket, is suspended from an arch the outer ends of which are bolted to the side members of the frame just back of the fan. Substantial feet on the upper half of the crankcase are bolted to the longitudinal frame members to provide anchorage for the rear of the engine and the flywheel housing and gear set, so arranged as to constitute a unit power plant.

The flywheel housing is integral with the crankcase, and bolted to this at the rear is the transmission case, making a compact arrangement. The clutch is made up of steel discs lined with Raybestos.



**Side View of Acason Three and a Half Ton Chassis**

Showing sectional radiator, worm-drive rear axle, dual rear tires, and semi-elliptic springs all around

The CCJ leads in circulation, advertising and prestige



### Gear Set

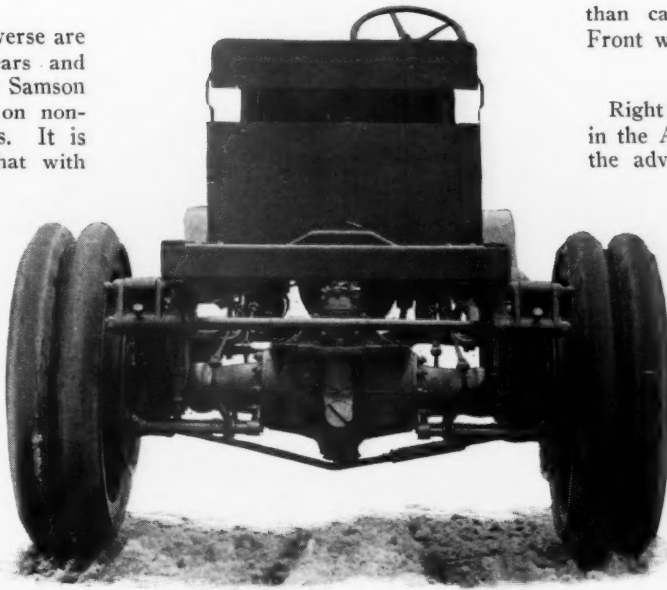
Four speeds forward and one reverse are provided in the gearset, the gears and shafts being made from No. 2 Samson nickel steel, the shafts mounted on non-adjustable S. K. F. ball bearings. It is pointed out in this connection that with this arrangement the gears are of necessity constantly in correct mesh, there being no chance for the variation which might occur from improperly adjusted bearings. The shifting mechanism is on top of the gear box, operating directly on the gears.

### Drive

Drive is through a two-piece shaft with three universal joints. The center bearing is supported on a frame cross member, and consists of an S. K. F. self-aligning ball bearing. The divided shaft prevents the whip which might otherwise occur in coasting or under heavy strain. With the truck loaded the line of drive is straight.

### Rear Axle

A worm-drive Timken-David Brown rear axle is employed. It is of exception-



**Rear of Acason Three and a Half Ton Model**  
Showing Timken worm-drive rear axle and general arrangement of parts

Wheels are of hickory, with square spokes, there being fourteen of these. The rear wheels are 38 x 5 in. dual, with the brake drums carried on the hubs. There are two sets of these, both enclosed, with the brake levers inside the frame and rods

than can be adjusted in several ways. Front wheels are 36 x 5 in. single.

### Other Details

Right side drive is employed exclusively in the Acason, it being the contention that the advantages of this arrangement in a truck in getting up to the curb to unload fully warrant the practice. The steering gear is of worm and nut type, with the connections back of the axle and protected by it. It is exceedingly easy of operation, while the steering post is so firmly installed as to do away with vibration.

The frame is of pressed steel, 7 in. sections, with 2 in. flanges. The steel is ¼ in. gage. Cross members, of which there are a generous number, are of pressed steel.

The Stewart vacuum system is used to supply gasoline to the carburetor, a 25 gal. tank being located under the driver's seat. The fenders at the front are heavy pressed steel. The dash also is of steel.

Wheelbase is 170 in. Equipment, in addition to driver's seat, includes oil side- and tail-lamps, hand-operated horn, jack and tool kit in steel tool box.

The noticeable differences in the 2-ton Acason truck are 150 in. wheelbase, 5¾ in. frame, two-joint driving-shaft because of the shorter length of wheelbase, and an increase in speed to 17 m.p.h. at 1100 to 1200 r.p.m.

### GASOLINE PRICES IN ENGLAND

According to advices dated May 24th, the prices of gasoline or petrol in Great Britain have risen to from 2/8 to 2/10 per Imperial gallon. Translated to American currency this equals at the present exchange rate \$.63 1-3 to \$.67 1-3. The Imperial or British gallon is 1.20032 times the size of the U. S. gallon, so these prices would be from \$.52¾ to \$.56 per U. S. gallon. The retail price in the United States at the present time range from \$.19 to \$.30 per gallon, depending on grade and locality.



**Acason Three and a Half Ton Truck**  
Forward part, showing power plant with one of the side panels of the hood removed. The top part of the hood is also removable

ally substantial proportions. Spring seats are integral, and to these are anchored the 50 x 3½ in. semi-elliptic springs. The front ends of these springs are secured to the frame by 1¼ in. bolts, those at the rear being 1 in. in diameter. These bolts at the outer forward ends are protected by a bell housing, with a grease cup to insure free lubrication. At the rear they are shackled to a heavy rod running across the frame. Both drive and torque are taken through the rear springs, the system being known as the Hotchkiss drive, which has found much favor particularly abroad. Radius rods and the customary torque member are thus rendered unnecessary. The front springs are 40 in. long and 3 in. wide, and have the conventional shackles.



**Acason Three and a Half Ton Model With Stake Body**  
The front of the frame is extended to form the front support for the front springs. Windshield and extended top to driver's cab give adequate protection against the weather to the driver

The CCJ brings greatest returns to advertisers because of largest circulation among quantity buyers

## Two New Models by Sterling, Five and Seven Tons Capacity

By HERBERT L. CONNELL

**W**ITH the addition of a 5 and 7 ton model, the Sterling Motor Truck Co., of Milwaukee, Wis., has completed a line of models from  $\frac{3}{4}$  to 7 tons capacity, which it designates as its new series. In all essentials of construction the different sized trucks follow a standard lay-out, the exceptions being the use of a simple pressed steel frame on the 1500 lb. job, instead of the armored wood frame construction, and the use of double chains instead of worm gearing for the final transmission of power on the 7 ton machine.

Since this latest of the worm drive models cover the features of the  $\frac{3}{4}$ , 2,  $3\frac{1}{2}$  and 7 ton models, except as just noted, its detailed description will give the reader a good idea of the complete new series.

### Engine

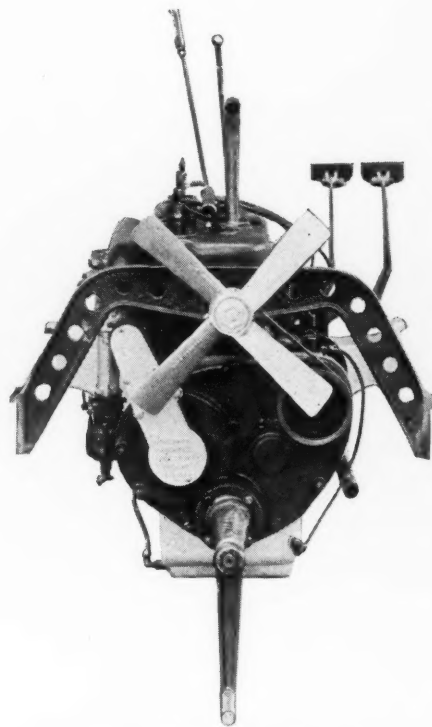
In the past this company furnished some models with the engine under the floor boards, but the new cars carry a unit power plant in front under the hood. The engine for the 5-tonner has a bore of  $4\frac{1}{2}$  in. and a stroke of  $6\frac{3}{4}$  in., the cylinders being four in number and cast in pairs. Valves are all on the right side and so are both the inlet and exhaust manifolds, which are held in place by yoke clamps. These manifolds come high on the engine so that the plates over the valve springs are very easily removed after unscrewing two hand wheels, one for each plate.

Accessibilty throughout the design is one of the special claims of the Sterling company and this seems to be well sustained. In this regard note should be made of the two large inspection plates on the right side of the upper half of the aluminum crankcase. Besides these, of course, the bottom half of the crankcase is removable for actual work on the crankshaft and connecting-rod bearings. Nothing is radi-

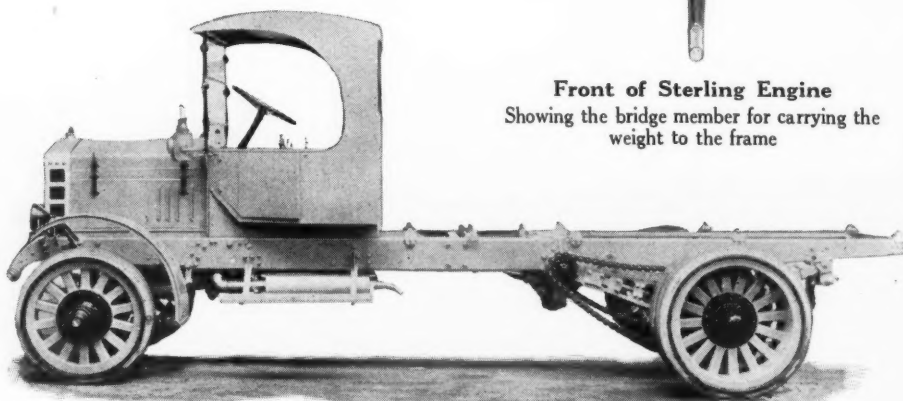
cal in the use of three point suspension of the power plant, but in this case the method of carrying the single support at the front is interesting, for instead of being near the plane of the crankshaft, the pin sets in a bracket on top on the front end gear housing. This same pin acts as a support for the adjustable fan bracket and the weight of the engine is carried over to the frame side rails by a high bridge member clearly shown in the accompanying illustrations.

### Engine Accessories

Engine accessories consist of a four-blade cast aluminum fan, an all-bronze water pump of the centrifugal type, a high tension magneto, a Holley springless carburetor and a centrifugal governor. Automatic advance is incorporated in the Eise-mann magneto, relieving the driver of the job of properly manipulating a spark control lever. The governor is driven from the front end gears and is completely enclosed so as to run in a bath of oil. It is set to give a maximum engine speed of 950 r.p.m. on the 5-ton truck, which cor-



**Front of Sterling Engine**  
Showing the bridge member for carrying the weight to the frame

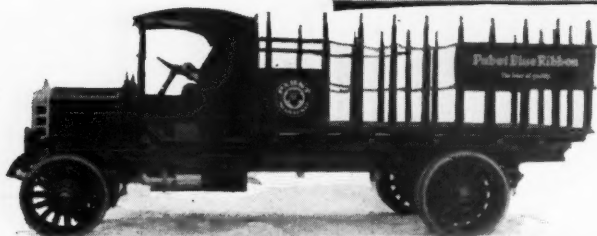
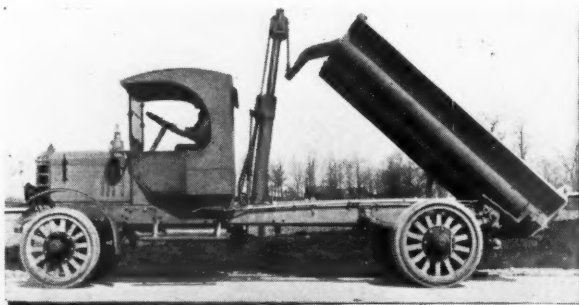


### The Seven-Ton Sterling Chassis

The cab and windshield on the seven-ton chassis are part of the standard equipment

### Five-Ton Sterling

Side view of automatic dumping body, showing especially robustness of construction and cleanness of lines.



### Five-Ton Sterling

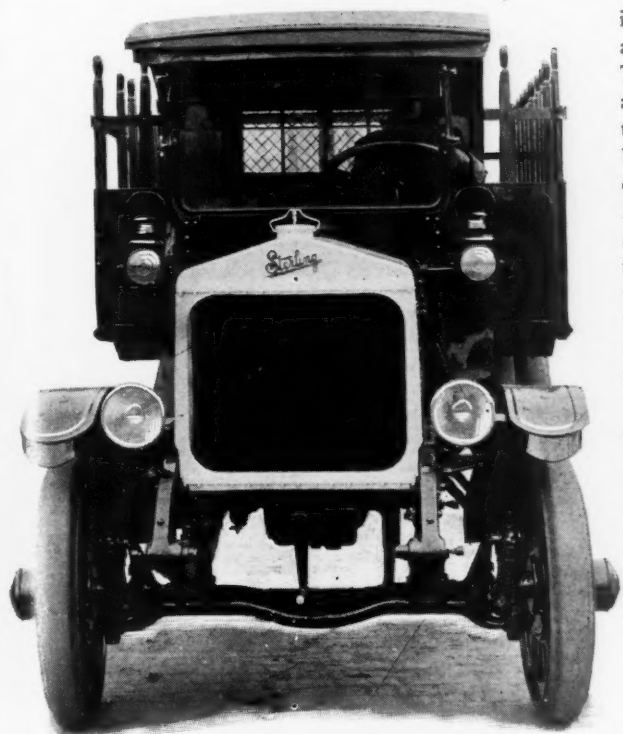
Side view fitted with stake body. Note location of hood clamps.

responds to  $12\frac{1}{2}$  m.p.h. on direct drive. Although the speed setting of the governor may be adjusted, the maker's warranty depends upon the seal remaining unbroken.

With the exception of the  $\frac{3}{4}$  ton model all the Sterlings have four speed gear sets. On the 5 ton job the gears give the following vehicle speeds:  $12\frac{1}{2}$  m.p.h. on 4th speed—direct drive; 8.3 m.p.h. on 3rd; 4.40 on 2nd; 2.56 on 1st; 2.15 on reverse.

A feature of this transmission element is that by removing the bell housing cap screws it may be removed from the bottom of the car without disturbing either the engine or the body. Between the gear set and engine is a multiple disc dry clutch having Raybestos facings. Between the power unit and the worm drive axle the drive is carried by a tubular shaft with a universal joint at each end. Steel caps keep in the lubricant and exclude the dirt on both of these joints.





**Sterling Five-Tonner, Head-On**

Note the easily repairable cast tank and tubular radiator

#### Axle Assembly

A David Brown worm and worm wheel are used in the axle assembly. Semi-floating axle shafts are employed, for which is claimed a decrease in weight over the full floating type of equal capacity. On all the worm drive models both the service and emergency brakes are on the wheels and act on the inside of the drums. In the case of the 5-ton truck the bands are 18 in. in diameter and have a width of 3 in. Also in all of the models of this type the driving thrust, together with the torque reaction, is taken by the rear springs.

Wood sills inside the steel channels are possibly the most unique feature of the Sterling line, this construction being employed on all but the  $\frac{3}{4}$  ton delivery wagon, which latter has a conventional pressed steel frame. These sills are of oak and run the length of the side rails. The channels are shaped to form beams of equal strength throughout their length and at the point of maximum bending moment are 9

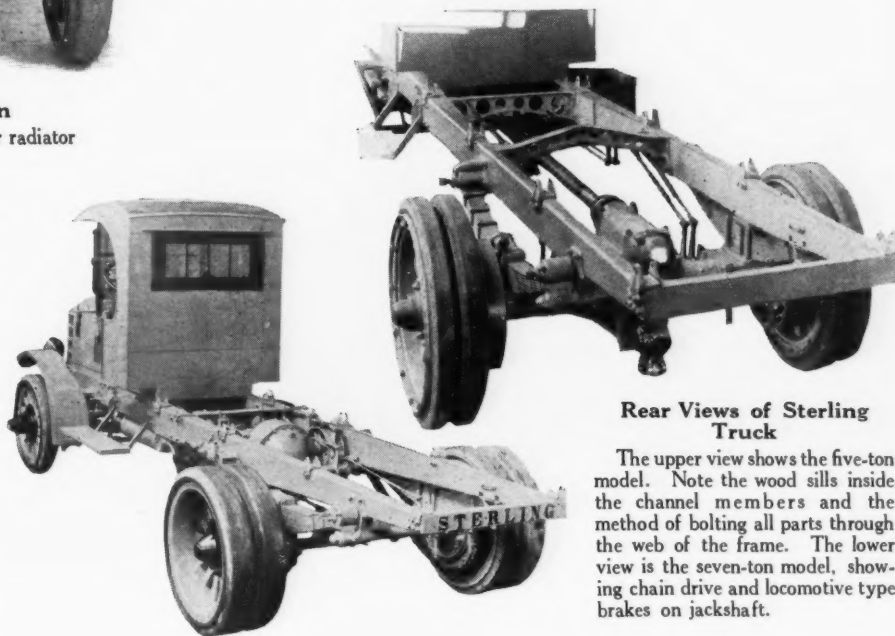
in. deep with 5 in. flanges and the steel is  $\frac{1}{4}$  in. thick. This construction allows for another unusual feature in that all cross members and brackets are bolted instead of riveted to the side rails. It should also be noted that all these bolts pass through the web of the frame, even the brackets for holding the body do not have bolts which pass through the flanges.

Briefly the other specifications of the next to the largest model are 36 by 5 in. tires in front, 40 by 6 in. duals in back,  $62\frac{3}{8}$  and 74 in. tread front and rear and a 168 in. wheelbase. The end of the frame is 13 ft. back of the driver's

seat and a 14 ft. body is recommended for standard loads, while a 16 ft. body is suggested by the Sterling company for light bulky loads. The weight of the chassis with cab and tires is given as approximately 8,900 lbs., which is said to be considerably lighter than other worm drive trucks of equal rating and is credited to careful designing and the use of high grade materials.

Standard equipment of the 5-ton chassis, which lists at \$4,500, includes the steel driver's cab, storm curtains, windshield, horn, oil, lamps, tools and hub mileage recorder.

With the exception of the final drive, the 7-ton truck is a counterpart of the one just described except as to size of the units. Power in this case is furnished by an engine of  $4\frac{3}{4}$  in. bore and  $6\frac{3}{4}$  in. stroke. It is governed to a speed of 950 r.p.m., which corresponds to a high gear speed of 10 m.p.h. On the other gears the speeds



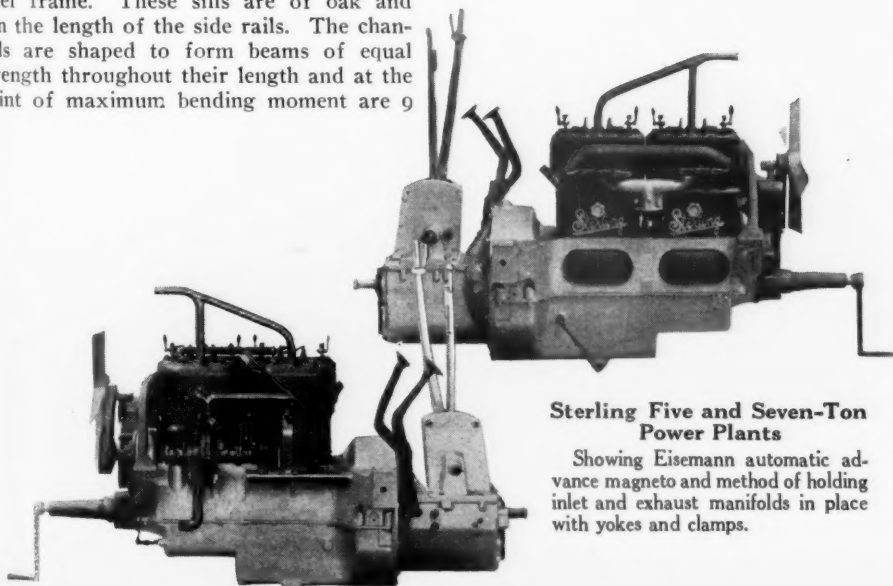
**Rear Views of Sterling Truck**

The upper view shows the five-ton model. Note the wood sills inside the channel members and the method of bolting all parts through the web of the frame. The lower view is the seven-ton model, showing chain drive and locomotive type brakes on jackshaft.

are 6.67 m.p.h. on third, 3.52 m.p.h. on second, 2.06 on first and 1.72 on reverse. Since a chain drive is used on this model the service brakes are mounted on the jackshaft. These are located inside the frame and are of the locomotive shoe type. The emergency brakes expand on the rear wheel drums and each is 20 by 3 in.

Distances between wheels are 64 in. in front and  $77\frac{3}{8}$  in. in the rear. The tires are 36 by 6 in. forward and 40 by 7 in. duals are fitted at the back. A wheelbase of 168 in. gives a frame length of 102 in. back of the driver's seat. Standard equipment is the same nature as the other model and the chassis sells for \$4,750.

The selling prices of the other Sterling models are \$895 for the 1500 lb. delivery, \$2,800 for the  $2\frac{1}{2}$  tonner, and \$3,400 for the  $3\frac{1}{2}$  ton chassis. The latter model is also offered with a special long wheelbase at \$3,550.



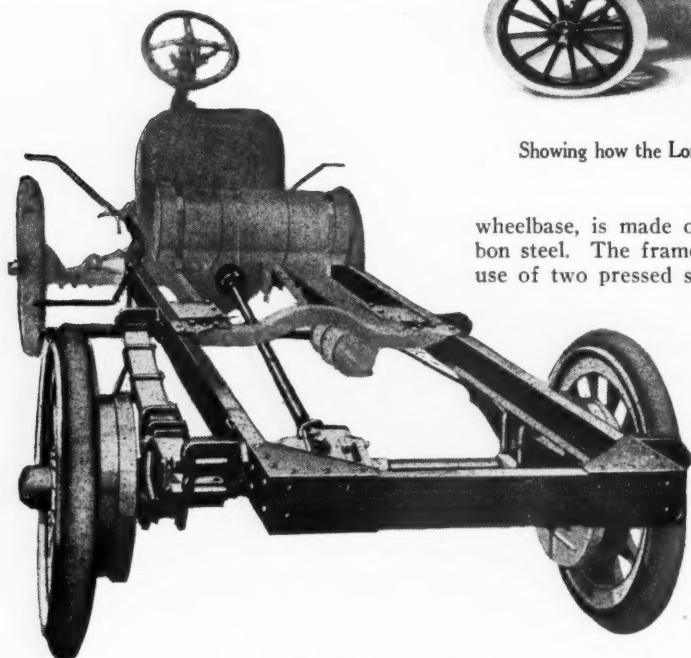
**Sterling Five and Seven-Ton Power Plants**

Showing Eisemann automatic advance magneto and method of holding inlet and exhaust manifolds in place with yokes and clamps.

### IOWA CHASSIS CONVERTS A FORD CAR INTO COMMERCIAL TRUCK

A truck type chassis portion, made to carry loads up to 3000 lbs., is made by the Iowa Motor Truck Co., of 313-17 East Second Street, Ottumwa, Iowa, and is designed to replace the chassis frame and rear drive portions of the Ford chassis. This Iowa commercial chassis is made to carry two capacities, 2000 lbs. and 3000 lbs. The differences are few, therefore the details of the 2000 lb. or one-ton chassis will be given, and the differences noted.

The Model E, one-ton chassis, has internal gear drive, roller bearings, gear ratio 9:1, drive to axle by tubular shaft with



**Iowa Commercial Chassis**

This is a chassis made to convert a Ford car into a commercial truck. The dark portion represents the Iowa chassis. It is made in two capacities

universal joint at either end. Brakes are external contracting, size 14 x 2½ in., springs are 52 x 2½ in., ten leaves, with ¾ in. shackle bolts, case-hardened, fitted with grease cups. Wheels are 32 x 4 in. artillery type, tires 32 x 3½ in. Motz. The frame is heavy steel channel, with corners reinforced with steel plates. The wheelbase is 124 in. Price, \$360.

The Model E chassis, one and one-half ton capacity, has brakes 17 x 3 in., tires 32 x 4 in., and springs 52 x 3 in., with ten leaves. These are the only important changes in the specifications of this model, the price being \$425.

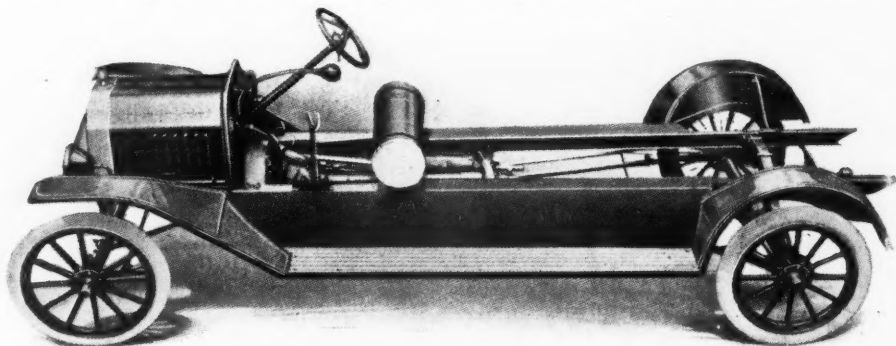
### LONGFORD AUTO PARTS

The Motor Accessory Distributing Co., 87 Haverhill St., Boston, Mass., is offering the Longford Auto parts, installed for \$125. These parts are designed to convert the stock Ford chassis into a truck providing a loading space of 8 ft. The maker calls attention to the fact that no greater weight-carrying capacity is claimed for the

converted car than is claimed for the pleasure car or short Ford truck at its normal capacity, but the change provides the great body space so much needed in lines of business where a light truck is required.

The patented extension drive-shaft of 3 ft., which lengthens the car to 136 in.

en over the old frame and fastened with hot rivets. In addition the under part of the frame is strengthened by a heavy truss rod on each side. A truss rod is also placed under the rear axle and the rear spring is strengthened by adding two extra spring leaves, a new center bolt and fittings.



**The Converted Ford Chassis**

Showing how the Longford parts increase the wheelbase to 136 in. The load is said to be evenly distributed over the entire chassis

wheelbase, is made of 40 to 50 point carbon steel. The frame is lengthened by the use of two pressed steel side frames driv-

A complete set of parts are supplied as follows: Two extension side frames, two spring leaves, four rear spring clips, one rear axle truss rod, one shaft extension support, one Longford extension drive shaft set, two running board brackets, one running board brace rod, two standards for side frame truss rods, two side frame truss rods, two brake rod extensions, two side mud pans, two running boards, one tail-light bracket, 15 cotter pins, one rear spring hanger, 35 rivets and 36 bolts.

The company states that the only work on the conversion of the car requiring anything but bolting after holes are drilled is the riveting of the side frames, rear spring hanger and running board brackets. It is further claimed that two men can easily convert a pleasure car into a truck with these parts in one day.



**A Hill That is On the Level**

We have two objects in mind for running this illustration: first, to show the hill-climbing capacity of the Riker worm-drive truck made by the Locomobile Company of America; and, second, to tell our readers that this is the first photograph of a hill-climbing stunt which we have seen in which trees and buildings are not slanting from 5 to 15 degrees from the vertical. In other words, this is one picture that is not faked. The stone weighs 9,555 lbs.

The CCJ has most advertisers because it gives them biggest returns



## NEW KISSELKAR TRUCK HAS CAPACITY OF ONE AND A HALF TO TWO TONS

The Kissel Motor Car Co., of Hartford, Wis., announces an addition to its line of trucks designated as the 1½ to 2 ton model. The general specifications are reminiscent of the former Kissel jobs, tending to justify the design as worthy of repetition. An indication of this is the selection of the worm drive as embodied in previous models.

### Engine

Built by the Kissel Co., the engine reflects the progressive policy of the maker. L-head type, unit power plant and three point suspension measure up to the exacting requirements of truck usage. The bore is 4¼ in. and the stroke 5½ in., four cylinders cast in block, valves enclosed. B.h.p. at 1200 r.p.m. is 36.75; S. A. E. h.p. 28.9.

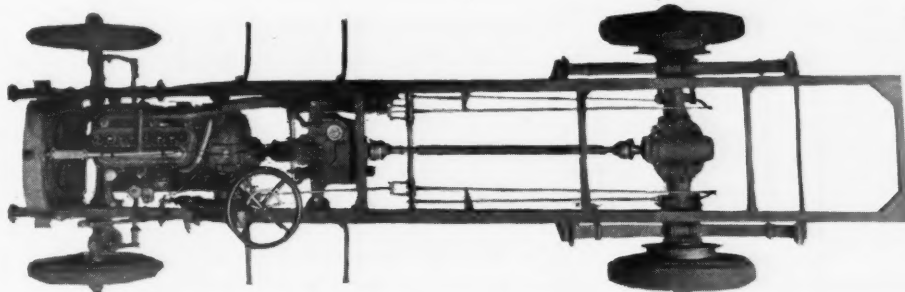
ed steel and in section is 6 in. deep, width 34 in. Wheels are S. A. E. standard.

Steering is through irreversible split nut and screw gear. Emergency brake and gear shift levers are centrally located and are within easy reach. The turning radius is 25 ft. Tires are front, 34 x 3½ in. solid, and rear 36 x 6 in. solid single. Gasoline

tank is under seat, capacity 20 gals. The governing device allows the engine to run 1295 r.p.m.

### Other Specifications

Wheelbase 144 in., length from back of seat to end of frame, 10 ft. Weight of chassis, 4300 lbs. Standard stake body loading space, length 10 ft., width 5 ft. 5 in.



Top Plan View of KisselKar One and a Half to Two-Ton Chassis

Kissel-built engine, speed governor, worm-drive axle and centrally located control are incorporated in this new one and a half to two-ton Kissel model



Side View of New KisselKar Truck

Showing the new one and a half to two-ton truck, which has unit power plant, Timken axles, and wheelbase of 144 in. Price, \$1875

Crankshaft is drop forging made of 40 per cent. carbon steel, mounted on three high quality steel backed, white metal bearings. Lubrication is by constant level splash and force feed system. Oil is strained before re-entering pump. A Kissel design Stromberg carburetor is used, fed by Stewart-Warner vacuum tank attached to engine. Ignition is by high tension magneto.

A leather faced cone clutch with adjustable spring inserts is used. Transmission is selective sliding gear type and has four speeds forward and one reverse. Gears are alloy steel, 7/8 in. face, running on F. & S. ball bearings.

Drive is shaft through Spicer joint to worm drive axle, which is Timken No. 6551. Timken David Brown worm, 9.25:1 ratio. Bearings are Timken taper rollers throughout. Rear axle is of full floating type.

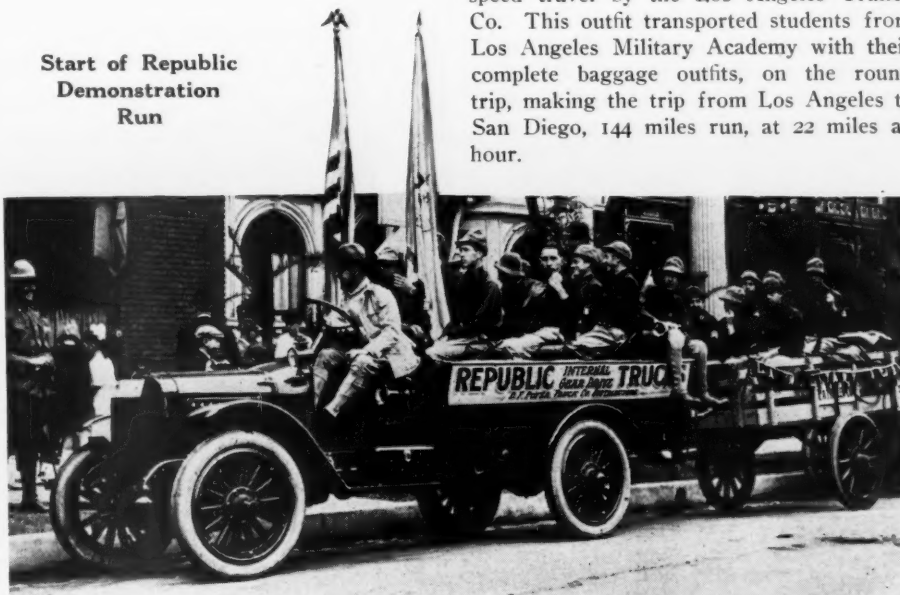
The front axle is Timken No. 1516, I-beam section 2 in. wide and 2¾ in. deep, drop forged steel. Steering knuckles and arms, special alloy steel, Timken roller bearings. Springs are semi-elliptic all around, front being 38 in. x 2½ in., rear 54 in. x 3 in. Both brakes operate on rear wheel drums and have equalizers. The frame is press-

Equipment: Two oil lamps, tail lamp, horn, jack, complete set of tools and steel channel bumper. Price of chassis in two coats of lead, \$1875, f.o.b. factory. Price with standard stake body, painted Kissel blue with black gears, \$2025.

## REPUBLIC TRUCK DEMONSTRATION IN CALIFORNIA MOTOR RESERVE RUN

California National Guard officials staged an automobile run of the California Motor Reserve Corps from northern cities to San Diego with exercises at Panama-California Exposition in that city at the termination of the run. From the northern cities to Los Angeles only touring cars participated, but at the Southern California metropolis D. F. Poyer, Republic truck distributor, donated the services of a three-quarter ton Republic truck, to which was attached a one-ton trailer of the type built for high speed travel by the Los Angeles Trailer Co. This outfit transported students from Los Angeles Military Academy with their complete baggage outfits, on the round trip, making the trip from Los Angeles to San Diego, 144 miles run, at 22 miles an hour.

### Start of Republic Demonstration Run



Scene is in front of the Southern California Motor Club. The Republic truck, towing the Los Angeles trailer, carried students from the Los Angeles Military Academy with their complete baggage outfits 144 miles at 22 m.p.h.

The CCJ leads in circulation, advertising and prestige

## CAST-STEEL WHEELS OF THE HOLLOW-SPOKE TYPE

By A. M. LEONI, M. E.

Member American Society Mechanical Engineers



**A** SUCCESSFUL cast steel wheel for motor trucks must be light, strong and resilient. To attain this it is essential that the proper quality of steel be employed; but it is also essential that the design be skilful and correct.

The designing of practical cast steel wheels is probably the most difficult job that, today, confronts the automobile engineers. Although the engine and transmission design has reached an almost complete standardization, the design of steel wheels is still in its infancy. That the use of good steel of high tensile strength and high elastic limit is essential is only too evident. However, no matter how good the quality of the material may be, if the design is not correct, the wheel is bound to fail either in the foundry or on the road.

Steel, as well as any other cast metal, is subject to two natural conditions, "crystallization" and "shrinkage." Neither one of these must be overlooked, and the design must be such to minimize their effect upon the castings. When molten steel solidifies in the moulds crystals are formed at right angles with the faces of the castings. The quicker a casting cools, the smaller these crystals become, and the smaller the crystals are, the greater the molecular adhesion of the metal, therefore, the greater the strength and resiliency of the casting.

In a casting that offers parts with remarkable differences in section the size of the crystals is naturally different at the different points, thus the distribution of strength and resiliency are uneven; also in a casting that offers right and sharp angles the crystals that are formed at those angles and joints form lines of weakness, which are the principal cause of failure in steel wheel construction. However, both, uneven crystallization and formation of

lines of weakness, can be offset by a correct design of the wheel.

Uniform thicknesses throughout, as long as possible, and in case of necessary differences in section, gradual tapering from one section to another, good fillers at the angles and the elimination, as far as possible of sharp angles and joints, are usually sufficient conditions to give wheels that will behave well both in the foundry and

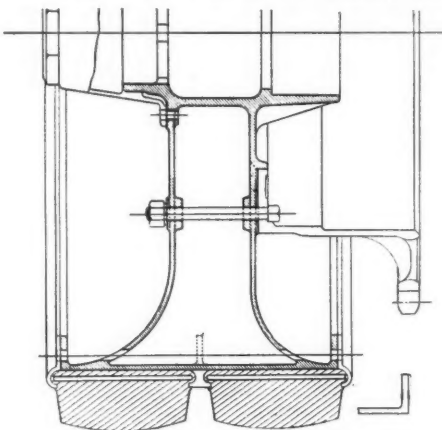


Fig. 2. Dayton Type Cast-Steel Wheel

on the road. The same can be said of shrinkage. If the section of a casting is kept uniform in character, the shrinkage will also be uniform and dangerous internal stresses eliminated. Perfect molecular equilibrium is then secured by the annealing process, to which all the castings are submitted before leaving the foundry.

A practical foundry man, who has had long experience in cast steel wheel manufacture, said: "The crux of the entire proposition is in the wheel design." Because lightness—without sacrifice of strength—can only be attained by a correct design and more resiliency can be given to a wheel by its design than by the content of carbon of the steel employed.

A number of successful steel truck wheels of the hollow spoke type have been built abroad since 1913—mostly all English and German—the design of which is

based upon the principles which have been previously outlined.

Illustration Fig. 1 represents one of these wheels cast in Germany by the Bergische Stahl Industrie of Remscheid, since 1913, for the English Firm "Commercial Cars, Ltd."

Illustration Fig. 2 shows the hollow spoke type wheel made by the Dayton Steel Foundry Co., of Dayton, Ohio, which very closely resembles the English and German construction shown in Fig. 1.

Fig. 3 shows a Dayton dirt-proof type of wheel, particularly adapted to trucks of heavy duty type and for road work, commercial or military.

The later type of wheel has great uniformity in thickness throughout, thus offer-

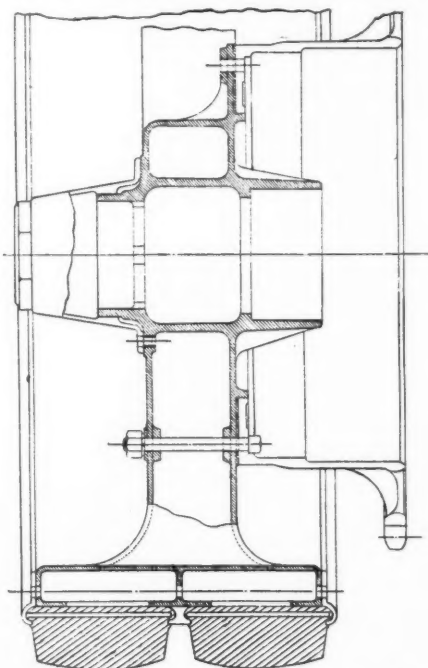


Fig. 3. Dayton Heavy-Duty Type Wheel

ing the best conditions for a fine and even crystallization and uniform shrinkage, which makes the wheel strong, light and resilient.

Angles and joints are almost entirely eliminated and broad, sweeping curves are predominant, making ideal connections between the spokes and the rim of the wheel, so that the broad rear wheels for the heavy duty trucks have felloes that permit the successive transmission of the strains, on the outer part of the dual tire, to the spokes without the danger of rim deflections.

In the wheel of the open-rim type (see Fig. 2) the vibrations are taken up by the flanges in the rim, which being free, are allowed to vibrate almost independently of the wheel itself, thus the shock energy is dissipated like vibrations at the end of a tuning fork.

In the wheel of the dirt-proof type (see Fig. 3) these vibrations are not so easily taken up by the rim proper on account of its more rigid construction, but they are in a great part carried out by the fins in the inside of the spokes so that the final result is that, in spite of a heavier construction, the conditions of resiliency are fully taken care of.

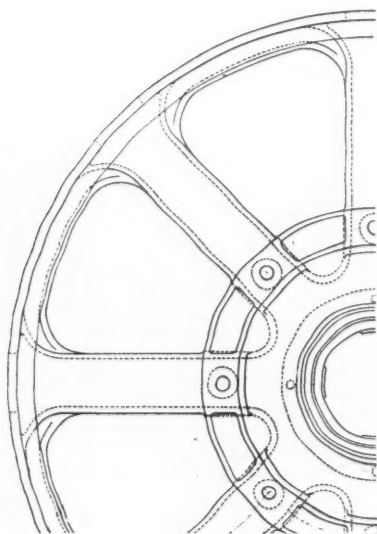
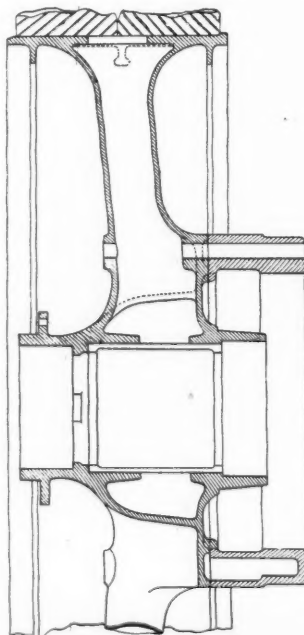


Fig. 1. Represents a Cast-Steel Wheel of German Make





# When the Country Garage Man Learns to Sell

Will the Country Garage Operator Wake Up, or Slumber Until the City-Experienced Salesman Buys Him Out and Capitalizes the Opportunity Now Dangling Before His Eyes?

By FRANK REED



**B**UY one. Get one of me, or my competitor, so I can get a chance to sell him the next one. If I know a man needs a truck and can pay for it, buying one is the only way in the world he can get himself out of my active prospects list."

In these few words the crack truck salesman of the great Southwest summed up the principles which have enabled this human dynamo to roll up a record that for numbers, regularity for signing them up, safe collections and percentage of hard cases has put him at the head of the list in a district where competitive salesmanship in the truck business never sleeps and gives no quarter.

"How does this work out when you try it on the farmer?" was the next query fired point blank and unexpectedly.

"Now you have hit the one weak spot in our campaigning and I will say right here that we are as strong as anybody else in the industry in going after this class of business. Any dealer who would have the courage to let his competitors have the town stuff for a while if he was not big enough to swing it, or who was big enough to add a big country campaign on the right basis and carry it through a couple of years, would have something in his wallet. We know everybody who is a prospect for a big fleet or an addition to a big fleet and we keep as close track of his business as his biggest creditor—and we know that all our competitors are doing the same. We are not so keen after the little single truck prospects because their business has no particular advertising value, and we have not formed a habit of going after them so hard and it costs a good deal more to keep in touch with them anyway. Furthermore, there is a good deal more uncertainty in dealing with them. They have not studied truck operation and learned to talk in a way that gives us a line on what we need to do to sell them, the way big fellows have. Still, those fellows are fairly close to it. But when we get out in the farming country and try to carry our selling campaign to the farmer we run across the expense of time and distance, we have all the difficulties that we experience with the little fellow in the city and a lot more that arise out of the fact that the man is a farmer. We do not know his business the way we know city business, and we find it harder to make the study of his situation which will satisfy us that the man can make good with the truck, and enable us then to prove it to him. We can go a long way in learning the farmer's business and its relation to transportation and developing interesting and positive ways of assisting the farmer to realize the possibilities of transportation applied to his business."

"Is there any chance that you can locate in farming districts the calibre of salesmanship required to do these things, and at the same time localize your service proposition so as to move your center of selling activity closer to your prospects?"

"You know there is a chance. You know the trade is sending out traveling scouts and salesmen, and that it is trying to break in garages in the small towns and out on the boulevards and show them a market so they will take a demonstrator and go at it seriously. But up to date this class of work is costing more than direct work for every prospect reached. You know a dealer has got to be mighty big, mighty broad-minded, and have a lot of money before he will reach out in this way, and he ought not to be compelled to do it all. It puts on the dealer a bigger burden than the manufacturer building up his business has in locating the kind of dealers he needs and helping them to get into the stride of selling activity he has a right to expect if he is turning out a good product. The distributor does not get enough commission to enable him to really cover his territory in this way where there is so much educational work, so much uncertainty as to the future and particularly the necessity of handling work on time payments. But, nevertheless, I firmly believe that this is a sound principle to work on and once it gets established in the industry will show remarkable results."

"If the Commercial Car Journal can help in educating the country dealer and garage

man, who already has an established business to take care of his overhead, and showing him that trucks in agricultural service have proved themselves, that his problem is one of learning how to talk to the farmer, how to make a demonstration and how to finance his sales locally, it will be a great help in what I am confident will be a tremendous field for expansion of truck sales within the next three years. Motor trucks are destined to broaden the band of productive country on each side of every railroad. They open up a national market to a district centered in home trade, and a city market to the little farmer who is leaving part of his lands untillied."

## Examples of Success in Typical Agricultural Activities

Trucks are making rapid progress under adverse conditions in orange hauling. In the first place, the orange industry is just "coming back" after a couple of very lean years. Tariff adjustments have badly wilted the California lemon industry. That has made people who wanted trucks go slow; but as that condition is passing there remain only physical conditions. Short hauls to packing houses, and splendid steam and electric railway development of Southern California are a feature of the orange and lemon districts which have made it hard for trucks to get a start. Nevertheless, they are finding their way to the orange country



## Full Loads Going and Coming Make Truck Haul Profitable

Back-haul loads of groceries, hardware and other merchandise for the country stores make it possible for the truck operator to bring agricultural products into the city markets at a very reasonable rate. The illustration shows a heavily loaded Autocar which runs on the 'dobe roads out of Los Angeles.

The CCJ is the only truck publication a member of the Audit Bureau of Circulations. There's a reason!

in constantly increasing numbers. An official of the California Fruit Growers' Exchange, which is the national marketing association back of the famous Sunkist brand, gives valuable information based on their observations. As this is not an operating organization in any way, but solely a selling agency, it has had no occasion to make on its own behalf one of the thorough studies of transportation problems such as it makes of the various marketing problems for the benefit of its members.

This official sets the average holding of the orange grower as about 15 acres. For cultivation operations he is obliged to use animals. When it comes time to harvest his crops the animals are idle and he does not figure his own time in, and customarily considers that by the use of his animals and driving himself he hauls his product to the packing house without any additional cash expense. On the other hand, there are some very large orange ranches and in practically every case these large ranches find it good business to own one or more trucks. The average haul for the orange rancher to the packing house is probably not over three or four miles, and in many cases the haul is very much under this, as the orange ranches are located in a valley served by several parallel railway lines. The acreage comprised within such a three or four-mile radius will supply fruit to keep busy a packing house of sufficient size for reasonably economical operation.

In Tulare county the orange ranches run back to the foothills located somewhat more distant from the railroad than in Southern California proper, and here there is a greater tendency to utilize trucks in hauling. There are examples where the introduction of trucks has enabled the far-off man to get his produce to the packing house as economically or even more cheaply than the close-in man could do with horses or mules. There are other cases where packing houses have gone so far as to give a differential to the man far out to help him in his hauling cost, so that he would be on an equally advantageous plane with the close-in orchardist, the object being to further the development of sufficient land to supply a packing house with enough volume on which to distribute the overhead expense and provide for economical opera-

tion. In still other localities packing houses themselves have purchased trucks and arranged to do the hauling.

The average orange grower is a man of high intelligence and has sufficient investment so that he can at practically any time command sufficient credit to purchase a truck if he decides it would be a good thing for him to have.

#### Contract Hauling Gives Truck Efficiency to Small Rancher and Builds Sales for Dealers

The handling of oranges for the local market in Los Angeles has been the principal matter in which trucks have made headway in the orange district, and they have done this in competition with a highly efficient railway service. The advantage the truck has on the short haul, in practically all cases less than 50 miles, is saving of repeated handling and shifting delays, direct pick-up and delivery by the original carrier. Concentration of responsibility and speed have already thrown a substantial part of this business to the trucks.

A. B. Minott recently purchased a one and one-half ton Republic, which he uses in picking up oranges in the Riverside district and hauling them into the Los Angeles market, where he sells them to the wholesalers. He is an example of a large number who have made trucks the basis of a small independent business, and in this case D. F. Poyer, the Republic distributor, has certain evidence that the operator has built up a good business.

Business ability is showing up among the hauling contractors as in other lines of effort, and theirs is proving to be a business which is capable of expansion when properly managed. A sample of the class of work which is open to these contractors is the case of O. P. Justice, of Montebello, who has been doing good work locally and has just closed a contract with the Japanese Melon Association to go to Imperial Valley and get the melon crops out to the railroads, a 90-day job, employing eight trucks. Mr. Justice uses a two-ton G. M. C. model as the latest addition to his fleet, having become converted to the tendency to employ the lighter trucks capable of giving a speed of 14 to 16 miles an hour. D. H. Jaques, who handles the sales of the

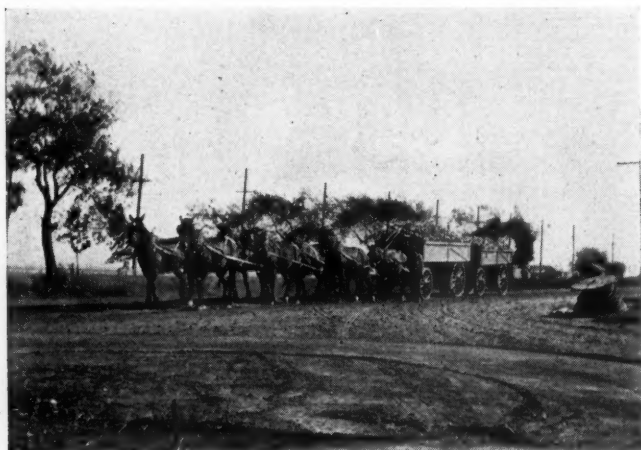
G. M. C. in California, for Don Lee, the distributor, believes that public recognition has been definitely obtained by the lighter truck. For many purposes the essence of success in motor truck transportation is speed. Users are not only educated to speed, but are becoming familiar to the idea that when a truck is laid up for repairs the cost is not only the expense of the repairs, but loss of income during the idle period. So users are insisting above everything else on a truck that will stand up in this class of service, not only on the boulevards, but on the country roads, in the grades and soft going, and deliver both rated speed and carrying capacity.

#### Introduce New Method in Dairying

Brawley Creamery and Cold Storage Co., in the Imperial Valley, is carrying the tendency to the use of light trucks to the extreme. They are using three model 15 G. M. C. three-quarter ton trucks, equipped with pneumatic tires for gathering milk on a schedule, which requires each truck to make 100 miles a day. They have obtained a great advantage through the use of speedy equipment as they are able to make two collection trips, picking up the morning and afternoon milking promptly, and saving the farmer the burden of keeping the milk for several hours in the warmest agricultural district in the country. The expansion of their business resulting from the success of this service has caused them to order three additional trucks.

#### Trailers in High Favor in Rural Districts

H. O. Smith, of Redlands, has demonstrated the advantages to an orange rancher of the use of truck and trailer. His truck is equipped with pneumatic tires and he drives it into the orchards, loads it with 40 boxes, and goes out to the trailer, which he has previously loaded with 104 boxes, and pulls out to the road. He hooks on to the trailer and makes the 5½ miles to the packing house in quick time, making his truck do the work of four teams on the road. He has reduced his outfit of teams to a single one for cultivation, which he finds amply serves his purpose, and sold off two teams. Now he says that he will dispose of his last team, as soon as he can obtain a satisfactory small tractor. As an



#### The Old and the New Method of Hauling Sugar Beets

Eight horses were required to pull the wagon and trailer. When they arrived at the dump, another team had to be hitched on to pull them up the grade. Contrast this with the ease with which the Jeffery truck is maneuvering in the beet field. The load of beets carried by the truck weighs the same as that carried by the eight-horse outfit.

The CCJ has most readers because it gives most information



orange rancher he is particularly impressed with the fact that his new transportation enables him to keep up with the picking, never requires a load to be kept out on a wagon all night or leave any portion of the crop stacked in the orchard over night.

A. L. Whiteside, of Newberry Park, is a good example of a rancher, who has been able to conduct his business much more advantageously through the possession of a truck. His principal business is raising and marketing hay in Los Angeles. His motor equipment consists of a two-ton Jeffery Quad and a three-ton trailer, one of the high speed reliability models produced by the Los Angeles Trailer Co. Going out of his ranch he has to pull over a 12 per cent. grade, but he averages a six-ton load. When he is loading in the edge of the field he takes his trailer and loads both truck and trailer and pulls them out at one haul. If he has a long haul from the middle of the ranch to the road he handles the trailer separate, pulling it out with the empty truck, and then going back and bringing out a truck load, after which he attaches the loaded trailer for the haul into town. For fuel economy Mr. Whiteside uses distillate, with a special 1 qt. auxiliary tank of gasoline on the dash for starting. His carburetor is a Stromberg and he uses the stove on the exhaust with which the truck is regularly equipped for heating the air supply and no other auxiliary.

Mr. Whiteside believes that the cost per ton of the haul from the ranch to the railroad, which he eliminated, was about as heavy using horses as his entire cost of hauling some 37 miles into the city with his truck and trailer. Furthermore, at the same time he not only eliminated the delivery haul in the city, but obtained full control of his shipments, so that he can deliver hay on telephone orders, or be absolutely certain of filling a contract on time to the minute. This has enabled him to compete for the business of the very best class of buyers and get it and his market is expanding. His ranch is a big one and he manages to keep his truck busy about all the year in the mild climate of Southern California. When he is not hauling hay or other crops he uses his truck and trailer for hauling wood, which fills in the winter season.

One of the dealers who sells a medium weight high speed car has noted a steady increase in the use of trailers. He finds that it pays and it is a good thing for both user and dealer if the man uses judgment in handling the proposition. This dealer says that "the first thing the trade must do is to keep every truck owner from buying a junk trailer." Show him the necessity of getting a good one that first cost must be enough to get automobile efficiency. If he gets a rattletrap trailer the unexpected cost and bother of his hauling is liable to be charged up as much against the truck as against the real source of the trouble. On the other hand, a good trailer will help him to make money so that he will eventually be in the market for another truck.

Hauling milk from the dairies is a field in which the truck and trailer combination has found particular favor. In some cases a trailer is taken out over the pick-up route behind an old touring car and at an agreed meeting point is hooked on to the truck, which in the meantime has picked up

its own load at the rate of two to twenty cans at each dairy. Then truck and trailer make the clear run into the creamery. One milk hauling contractor who operates two trucks and one trailer pulls the trailer behind one truck one morning and behind the other one the next, thus equalizing the wear on his machines.

#### Milk-Hauling Contractor Earns Cost of Truck in Year

E. N. D. Hatch, of El Centro, was Wells-Fargo Express agent. He bought a one-ton Jeffery truck and went into the business of hauling cream from dairies to Holtville Creamery. He laid out a route that calls for 100 miles every day. There is some sand on his route, but the most interesting

ported to have paid for his truck out of earnings in the first year.

A check-up of the representative Auto-car users shows that a good number of them are either ranchers or engaged in hauling ranch or dairy products. A ranch which is big enough to have an all-year season, or a very heavy peak haulage, will probably own at least a part of the trucks it requires for its maximum business. Smaller ranchers employ contractors to do the hauling. In hauling melons, tomatoes, cabbages, etc., the tendency is to employ smaller units and get quicker movement than when trucks first began to be employed in the class of hauling.

N. D. Wilson is a Los Angeles grocer, who has made fresh vegetables a real



#### Truck Builds Up Fine Business in Fresh Vegetables

The N. E. Wilson Company, of Los Angeles, grocers, has built up a fine business in fresh vegetables by getting acquainted with a number of ranchers outside of town and making early morning trips to pick up an absolutely clean and fresh stock of high-grade stuff every morning before the car is required for regular grocery delivery.

road condition which he has to encounter is that which is characteristic of Imperial Valley, the soil of which is silt, deposited by the Colorado River. The roads are built with a ridge in the center, with dirt surface for vehicles on each side. Traffic cuts up the surface and then the road authorities flood one side, and when it reaches the proper state of dryness, smooth it off with a scraper. The sun hardens it and while it is getting into condition traffic uses the other side. Sometimes, however, a little too much water is applied and it works over beneath the ridge, which normally acts as a dam, to the side used by traffic, and once the truck breaks through the crust it is practically in a quagmire with the bottom perhaps 20 ft. down. The reverse condition is encountered when the road is roughened by traffic and particularly by the passage of sheep and cattle. When it is wet the sun is liable to bake it dry with all the rough formation as hard as cobble stones, and it takes a week or so to wear them down. Of course, road conditions are being constantly improved, but Mr. Hatch has had a good deal to contend with, and in spite of the difficulties and the fact that he was in a new business, is re-

trade builder, both a substantial revenue producer and a good advertisement. Early every morning he sends his fast truck out into the country to buy any good stuff from the ranchers, and it is brought in absolutely fresh and sold before the dew is off.

#### Japanese Active Buyers, Who Follow a Leader

Japanese who are leasing ranches in Southern California are rapidly coming to motor transportation. Many of them who were formerly advocates of the old touring car and cheap trailer have become educated and now they are buying moderate capacity high class trucks which will cover the road at a good speed. The next purchase is a trailer, then another truck, and another trailer, etc. In dealing with Japanese the truck dealers find that they get the best success through selling a machine to some Japanese who has not only sufficient use for it to enable the truck to make good beyond question, but who occupies a position of influence among his fellow-countrymen. Courteous and fair treatment and first-class service on this initial sale is almost certain to create a steady expansion of business gained practically without effort, as the Japanese are bound together

The CCJ has most advertisers because it gives them biggest returns

in co-operative organizations and place their business with the people who gain the confidence of the leading men.

T. Oto, who is in the famous Gardena strawberry district, used to bring his crop in with horses. Although he is only a few miles out he had to start at two o'clock in the morning to get to the market in time. Last year he used a big truck with hard tires and although it was better than horses, he realized that speed was the big thing and this year fitted himself out with a Model 15 G. M. C. three-quarter ton machine. He brings in up to a 2200 lb. load in an hour and gets better sales and better prices because his berries are delivered fresher than those of his poorly equipped competitors.

The agricultural hauling not only presents a field which is automatically absorbing a rapidly increasing number of trucks, but in the opinion of the Jeffery agents in Los Angeles is worth the expenditure of selling effort for further development.

In the beet sugar industry trucks are working out in good shape, as they not only give better service to the ranchers, but serve the dump with more reliability and make it unnecessary to use an extra team for hauling the outfit up the dump.

Jean Adoue, of Baldwin Park, has been pioneering the use of a truck in hauling hogs into Los Angeles and feed for hogs and cattle for the back haul. He raises hogs for the packing houses. No definite figures are available as to his success, but that it is substantial is indicated by the fact that he has already created another prospect for a Jeffery truck, who called on the dealer and said that he was in the same business as Adoue and noticed that the latter was doing valuable things which he could not accomplish with a team and an old touring car, so he felt that he would better get in line.

The limit for truck farming used to be a district of 10 or 12 miles from the city. Now they come in from 100 miles out. The fact that land is cheaper farther out offsets the delivery mileage. It means a good deal to a certain man in Hemet that he can do what he actually is doing, come in the 100 miles to Los Angeles with a one to three-ton load, which, by the way, he carries against all reason in his one and one-

young fellows who are growing up and just casting about for something to do that is a little livelier than ranch work, look on this business with more or less longing eyes, and these sons of ranch owners make the very best kind of people to get into the hauling business.

Futhermore, men who operate the larger ranches are very quick to take notice of the speed of the machines which they



H. O. Smith Uses Truck and Trailer On Orange Grove

half ton Autocar, and get back home on the same day.

Potter Farm, at Santa Barbara, is an adjunct of the famous hotel Potter, which caters to the wealthy and critical tourists. Freshness in milk, butter, eggs, cream, fruit and garden products is here a consideration beyond price. This primary perfection is obtained with actual economy through the use of a speedy light truck in transportation.

The farm products hauling contractor is one of the biggest factors in creating prospects amongst the actual ranchers. The

see running back and forth near their places. In these days of quick communication of ideas it does not take the country long to follow the city—and with the cities almost wholly motorized the destiny of the farms is forecast.

Selling the rancher a truck by mail is just about impossible. Letters and booklets will interest him and get his attention to general truck problems, but they will not sell him a particular truck, unless it is one with which he has become well acquainted, through seeing it in constant operation for some time in his neighborhood.

#### Views of the Allis-Chalmers Tractor Truck

Made by the Allis-Chalmers Company, Milwaukee, Wis.



On the left is shown the tractor hauling 12,900 pounds through snow twenty inches deep.



Above is being demonstrated the wonderful flexibility of the machine. The machine has gone over the top of rails and is ascending a steep embankment.



Above is shown the front wheels over a steep embankment. To the left is shown the independent flexibility of the track wheels.



The CCJ leads in circulation, advertising and prestige





## Truck Owners Have Decided the Tire Leadership

A count of all truck tires in service today would show many more Firestone tires than any other make. For years Firestone tires have headed the list.

This is the unanswerable evidence of Firestone quality furnished by the truck owners themselves. Their preference is based on experience—the surest of all guides in selection.

With by far the greatest range of types produced, we can supply the tire exactly suited to your special needs—a tire for every road, load and condition of service. The pressed-on type here shown combines the unmatched resiliency and long-wearing toughness that distinguish the entire Firestone line. These tires can be applied to any S.A.E. wheel in a few minutes. They are pressed on the wheel under heavy hydraulic pressure. Creeping is impossible. Made in compounds for both gasoline and electric trucks.

Call on the Firestone headquarters nearest you for the experience and counsel of tire specialists. Or write us for details and low prices.

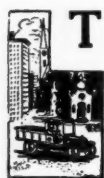
**Firestone Tire and Rubber Company**  
"America's Largest Exclusive Tire and Rim Makers"  
Akron, Ohio—Branches and Dealers Everywhere

# Firestone

## TRUCK TIRES

## Seattle's Market Radius Doubled by Motor Trucks

By WARREN EUGENE CRANE



**T**HE market radius of Seattle has been more than doubled by the installation of motor trucks in the work of bringing produce, butter, eggs, milk, poultry and cattle into the city. When horses were in use, the majority of fresh vegetables came from O'Brien, Al-lentown, Riverton, South Park, Des Moines, Duwamish and places within the twenty mile circle; however, with the advent of motor vehicles, they come from Auburn, Sumner, Tacoma, Puyallup and country within a radius of forty miles. This has caused a decrease in the cost of fresh vegetables in Seattle. While the prices of furniture, clothing and staple groceries are higher than in Eastern cities, due to heavy freight charges across the mountains, the cost of fresh vegetables and fruit are less than in other large cities. In the month of May, radishes often sell at the public market for seven bunches for five cents, cucumbers are three for ten cents, solid heads of choice lettuce sell at three for five cents and other products on the same scale. It is due to the fact that the city is very close to a fertile garden and fruit growing country in the Duwamish and White River Valleys, which are easily accessible by the excellent Pacific Highway that makes the journey easy for big motor trucks carrying huge loads of produce into the city.

The Pine Vegetable Co., Seattle, of which T. Kimura is manager, uses one 2-ton and one 1½-ton Kelly-Springfield truck in hauling produce from the gardens around Auburn, Kent, Argonna, Sumner and O'Brien, and once a month they go to Tacoma, 38 miles away, where they get a big supply of vegetables. This firm was established two years ago and they have

used trucks exclusively for hauling since their organization.

Mr. Kimura says that they buy from the gardener and bring the produce into the city where they sell on a commission basis. During the two years that the trucks have been running, he claims that they have kept the machines going incessantly, averaging thirty miles a day with each truck, and find them very satisfactory. They use from 10 to 20 gallons of gasoline a day for the two trucks, with an average of 15. The reason for this variation is due to the fact that their long trips are taken early in the week and the shorter ones on Friday and Saturday. Their average gasoline cost

runs 3½ cents per mile and they use a 50-gallon barrel of cylinder oil every two months in the two cars, making an average of 12½ gallons of oil each month for each car. They pay 43 cents a gallon and they have twenty-six working days; their oil cost averages 12 9-10 cents per day for each car, or a little more than 1-3 cent a mile figuring on a 30 mile a day basis.

They are very careful in their method of loading not to injure any vegetables by rough handling, and they always put heavy sacks of potatoes at the bottom of the truck. In fact everything possible is done to give their clients as efficient service as possible in bringing the produce to the city.



**Truck Displaces Three Teams and Cuts Expense of Haul in Half**

This truck averages 35 miles daily, and makes as high as 150 calls



**A Detroit Electric Fitted With Graduated Shelves**

This is one of the twelve electric trucks used for distributing milk throughout the different districts of Seattle

The Hollywood Farm uses one 4-ton Packard truck in hauling milk and other dairy products from their model farm 22½ miles away. A. Van Vetchen, their Seattle manager, claims that this eliminates the delay of phlegmatic milk trains jerking through the country and the incessant jolt of horse teams over country roads. The prompt service afforded by this big truck insures the sweetness and freshness of Hollywood milk and butter, which sell for a price three cents higher than other products because of their high reputation for purity. Their total operating cost is five cents a mile including gasoline, cylinder oil, tires, repairs and depreciation. They also use twelve electric trucks with graduated shelves (like the accompanying illustration) for the distribution of milk throughout the different districts of the city, with excellent results.

A little over a year ago Desimone Bros. & Co., who had been in business in Seattle since 1899, were on the point of selling

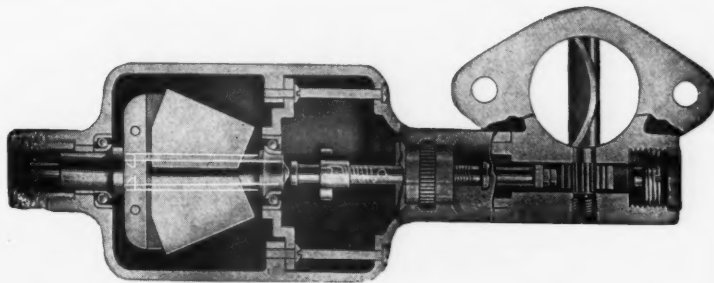
The CCJ is the only truck publication a member of the Audit Bureau of Circulations. There's a reason!



# PIERCE

## GOVERNOR

### The Favorite of the Engine Builders



The Pierce Motor-Driven Governor here shown is the one that the leading engine builders place on their product to control the engine speed.

This Governor is operated direct from the engine, being attached to any exposed rotating part and is adjustable to any desired number of revolutions per minute.

Among the users and endorsers of this Governor are the makers of the Continental, Rutenber, Wisconsin, Waukesha and Herschell-Spillman motors.

There are two other Pierce Governors which control the vehicle speed and are used by hundreds of concerns who wish to prevent their trucks being racked to pieces by reckless drivers.

If one of these three Governors is not on your trucks you should lose no time in learning how advantageous other truck users have found them to be.

## PIERCE GOVERNOR COMPANY

Anderson, Indiana, U. S. A.

*Originators of Speed-Controlling Devices for Gasoline Cars*  
**THE WORLD'S LARGEST GOVERNOR BUILDERS**

their interests on account of the increasing cost of the expense of operation. They were forced to rise every morning at 3.30 A. M. and work until 5.30 or 6.00 P. M. Their expense was \$800 a year for new horses; \$100 a year for new wagons and equipment, repairing and painting, and \$100 a month and board for two men. This expense was more than consuming their profits. Finally they purchased a  $\frac{3}{4}$  ton Buick truck, which they are now using to haul vegetables from their gardens nine miles from the center of the city to their stall in the Westlake Market, and the groceries in the Pike Street, Broadway, Capitol, East Union, Madison Park and Madrona Districts. They are making as high as 150 calls a day, starting work at 5.30 A. M. and completing it by 11.30 A. M. They cover thirty-five to forty miles per day and use from 18 to 20 gallons of gasoline weekly, or a little more than three gallons a day at a cost of 18½ cents per gallon. This makes their fuel cost per mile one and 58-100 cents, figuring 35 miles as their daily mileage.

They have put only two new pneumatic tires on the machine during the fourteen months it has been in use, and have bought 20 gallons of oil. They have three gallons on hand, making 17 gallons in 14 months, or an average of one and 3-14 gallons per month. Guiseppe Desimone stated that they have been able to dispense with three teams and half of their expense for help and at the same time have given the customers better service than before. Where they formerly sold \$1500 to \$2000 worth of produce yearly from their 20 acre tract, they are now selling \$5000 worth, in addition to the vegetables which they use themselves.

They are very careful in the way in which they arrange their produce—with the heavy vegetables like potatoes, cabbage and corn on the bottom of the load and the radishes, carrots, onions and celery in a fancy display on top to attract the eye of the grocer.

The Shore Brand Poultry Co., of Seattle, have a Ford touring car which has been converted into a half ton truck, for the purpose of hauling poultry from their ranch at Sunnysdale 15 miles to their store in the Sanitary Market. Their machine covers 50 miles a day and its total operating expense, including gasoline, cylinder oil, tires which cost ¼c. per mile, depreciation at the rate of \$50 a year and \$9 a year for insurance, makes their operating expense \$1.70 per day, or about 5c. per mile.

The expense account of the company from May 1st to May 17th, inclusive, is as follows:

May 1—Gasoline .....	\$1.00
May 2—Repair work, lamp ..	.85
May 4—Carburetor Repair ..	1.00
May 4—Gasoline & Timer ..	.98
May 5—Gasoline .....	1.40
May 6—Gasoline .....	.40
May 8—Gasoline .....	.40
May 9—Gasoline .....	1.70
May 10—1 Tire .....	9.25
May 11—Gasoline .....	.65
May 13—Battery charging ..	2.00
May 13—Grease & Oils ..	1.25
May 13—Gasoline .....	1.00
May 16—Gasoline .....	1.15
May 17—Gasoline .....	.78

\$23.81

S. G. Levy, manager of the company, states that where they were formerly forced to haul their produce three and one-half miles by team to the interurban station at Lake Burien and pay \$35 a month freight to the Electric Co., as well as expensive drayage charges from the Seattle station to their store, they now do double the work at a cost equal to the sum paid in the past for the personal car fare of the members of the company to and from the city. Where their trips used to take two hours and more, they now cover the distance in an hour and fifteen minutes. In common with a majority of the Seattle produce and dairy dealers they claim that the motor truck has been a great benefit to their business—from the standpoint of economy and efficient service to their customers.

### SELLING STUNTS BY THE SALES MANAGER

By LEN G. SHAW



HERE is just one hard and fast principle that can be applied universally to the science of selling trucks—and that is to sell them." The speaker was the sales manager of one of the most successful truck manufacturing companies in the Middle West, a concern that in a little matter of two years has jumped from an inconspicuous place at the rear to a position in the forefront of the industry. The conversation had drifted around to salesmanship, and this statement was the result of an inquiry as to whether it was possible to formulate merchandising rules elastic enough to serve different localities.

"It has been my observation that placing trucks is largely a matter of individual salesmanship," went on the salesmanager. "The methods that work out fine in one locality might fall flat in another. And even the same tactics employed by someone else in the identical territory may fail to score—and the wisest of them can't tell why. Here's a case that illustrates my point. In one of the big cities of the Middle West is a man who last year sold more of our trucks than did all his competitors in the same class combined. And he did it with less work than they put on the job, in spite of the difference in results.

"This man has a splendid establishment—fine salesroom and service station—and he's on the job all the time. On the showroom floor you will find a truck, and in front of the place stands a big, high-powered motor car that is always ready for duty.

"In comes a prospect, to be met in person by the proprietor. He is interested in a truck? The job on the floor is given the once over under guidance of the chief himself, or, if he happens to be busy, by one of his assistants. The strong points of the truck are indicated, and then the idea that is making this man rich is put into use.

"I could keep you here all day, and tell you what our trucks are doing, but I'm not going to," says the agent. "If you can spare an hour, I'd like to have you find out at first hand just what users think of

them. My car is outside now, and I'll send a man with you right where our trucks are in use every day. Have a talk with the transportation manager. Meet as many of the drivers as you can. Ask them—they know. You'll get more information in a few minutes this way than I could give you in a week—and it will be the truth. I'm willing to abide by their verdict."

"Then the prospect is taken in tow by the driver of the car, who also is a salesman, and goes to some concern where a number of our machines are used, and is made acquainted with the powers that be in the transportation end. Perhaps he is not entirely satisfied with results at the first place. The driver knows of other firms, and he is driven there. In a little while he has learned enough to convince him, and he goes back to the salesroom ready to buy.

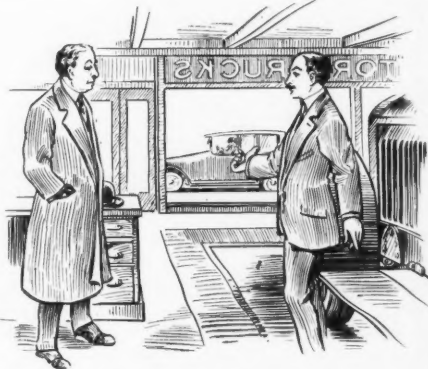
"Our representative has spent an hour or so with the prospect—and the sale is made. Of course, it doesn't always work out that way, but you'd be surprised at the large percentage.

"What the prospect wants to know is results—and he gets them quick from the user. Of course, the agent is careful to send the caller where he is certain a favorable reception will be accorded.

### A Booklet With Telephone Numbers

"Another live wire agent got a booklet that was one of the swellest things I ever saw in the printing line. It was made up of letters of recommendation from users of the trucks he sold—usually signed by the president, if it was possible to get him to do it.

"In nearly every case there was a picture of the trucks used by the firm that wrote the letter, and often a picture of the head of the house. Accompanying each testimonial was the telephone number of the concern, and the recipient of the book was



"I'll send a man with you right where our trucks are in use every day"

urged to call up any or all of the parties and satisfy himself as to their opinion of this line of trucks.

"Of course, having publicly endorsed the trucks none of the men quoted would have gone back on his printed expression, even had there been occasion for doing so, which was not in this case, as the trucks gave universal satisfaction.

"This plan produced big results—but not everybody could put it over, because they wouldn't be able to get such an imposing array of endorsements."

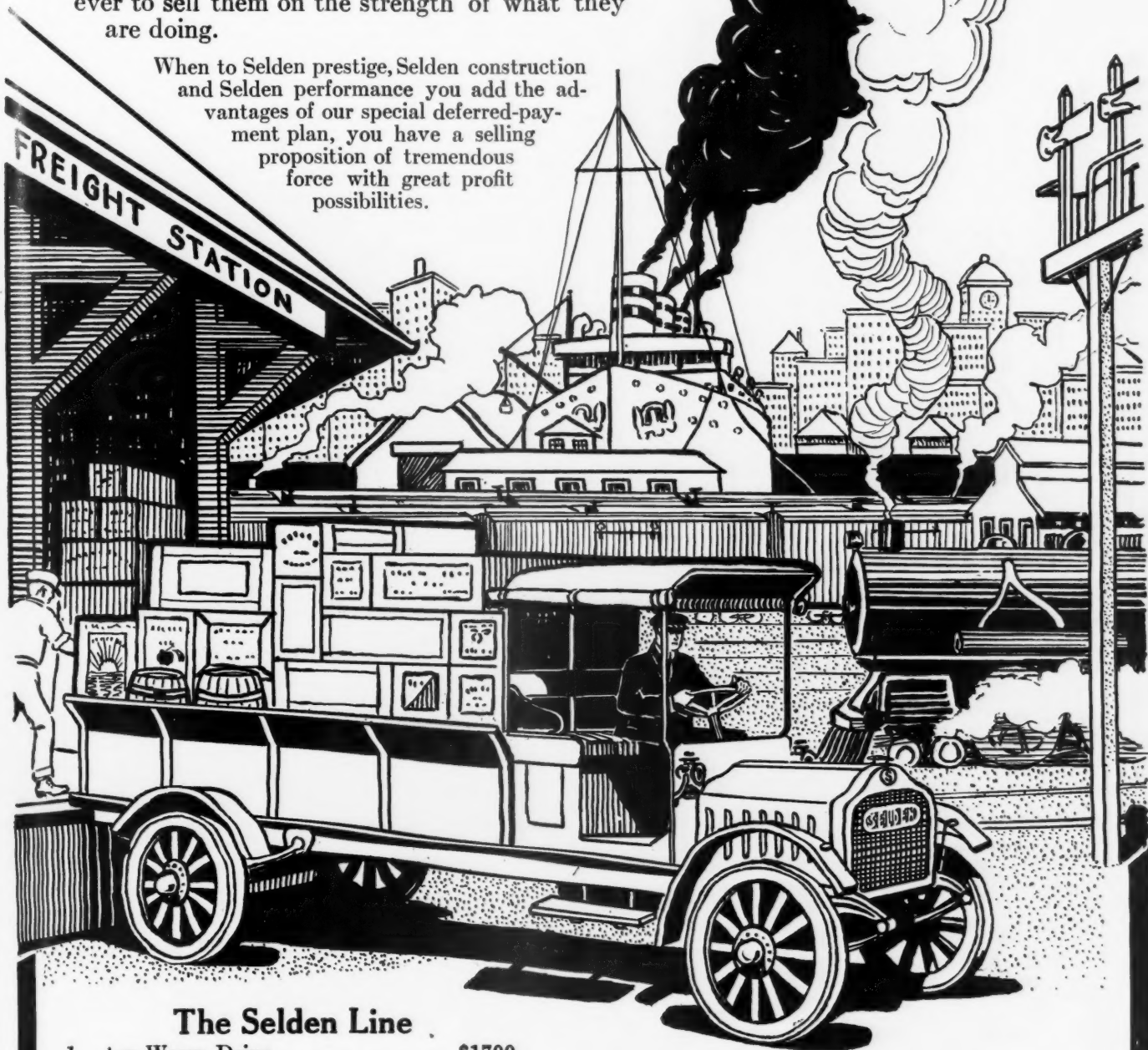
The CCJ has most advertisers because it gives them biggest returns



# SELDEN TRUCKS

In the busy marts of trade on this continent and in Europe, Selden trucks are giving such service and earning such a reputation that it has become easier than ever to sell them on the strength of what they are doing.

When to Selden prestige, Selden construction and Selden performance you add the advantages of our special deferred-payment plan, you have a selling proposition of tremendous force with great profit possibilities.



## The Selden Line

1	ton Worm Drive - - - - -	\$1700
2	" Worm Drive - - - - -	2250
2	" Internal Gear Drive - - - - -	2000
3 1/2	" Worm Drive - - - - -	2950

Write for our sales plan—  
it may mean much to you

**Selden Truck Sales Company, Rochester, New York**

## Possibilities of the Constant-Pressure Cycle

(Continued from page 10)

will build up rapidly unless some relief valve be provided. To put this on the receiver would, of course, mean the loss of much of the work of compression. Hence a single unloading valve 15, operated by piston 14 is provided. When the pressure in the receiver rises above the 150 lb. desired, the valve 15 is forced open against its spring and the air in the cylinder is simply discharged to atmosphere with only slight loss of power.

If for any reason a momentary overload is to be carried by the engine some device such as 16 for increasing the tension on the spring that normally holds the unloading valve closed, can be brought into play. In the case of a motor-car engine such a device could be operated by a simple dash control.

Fuel is supplied to the engine as follows: The pump 13, positively driven from the engine, draws the fuel from the main supply tank and delivers it to the reservoir 18 in which a float or some other device maintains a constant level. Any surplus fuel pumped is by-passed or returned to the main supply tank. The small tank 18 is maintained at a pressure somewhat less than receiver pressure, depending upon the air velocity through the restricted area 22. From this tank the fuel is drawn through the spray nozzle 12 by the injector action of the air passing the nozzle. The flow of fuel will of course cease immediately when the air flow ceases on account of the closure of the admission valves 9. A correct proportioning of fuel to air may be accomplished by proper adjustment of the regulating valves 23 and 24, Fig. 2. As the velocity through the atomizer 25 increases the natural tendency toward over-richness is counteracted by the proportionately diminished pressure in the restricted area at 22.

The admission valves 9 can be made of the Corliss, slide or poppet type, as proves most desirable, and be operated by any conventional cut-off device such as, for example, is used in steam engine practice. In the case of a motor-car engine the point of cut-off would be varied by a device operated in precisely the same manner as is the throttle on an ordinary Otto cycle engine. The throttle valve 20 shown in Fig. 2 would be used only in starting.

The check valve 21 prevents air in the receiver escaping to atmosphere when unloading valve 15 is open. The admission valve can, if desired, be left open during practically full stroke when a heavy torque is required. The card would then be practically square and resemble closely a card from a steam pump. Under this condition the fuel consumption would of course be much increased because the gases would not be allowed to do work in expanding after cut-off. The periods when such a late cut-off might be used would be short in an engine properly proportioned to the load.

The striking similarity of the constant pressure cycle to that of a steam engine is at once apparent. But while the results are equal in every way to those accomplished with the steam engine, the engine is self-contained and does not require the boiler, condenser and other elaborate external apparatus necessary in the case of the steam engine.

### Description of the Burner

The operation of the proposed cycle is dependent to a large extent upon the functioning of the burner marked 17 in Fig. 2 and shown in detail in Fig. 3. To understand

the operation of this burner it is necessary first to have clearly in mind certain fundamental laws governing flame propagation. Imagine a tube composed of material that is a non-conductor of heat, this tube being closed at one end and open to atmosphere at the other. Now suppose the tube be filled with a highly combustible mixture of air and gas. If the mixture be ignited near the open end of the tube the flame will travel toward the closed end at a rate of speed dependent chiefly on the quality, temperature and pressure of the mixture.

Suppose now a vessel containing a combustible mixture under pressure be connected to the open end of the tube. If the end of the tube formerly closed is then opened the combustible gas in the vessel will flow out through the tube at a rate dependent upon the pressure. If now the mixture be ignited at a point midway of the tube the flame will propagate itself either toward the vessel or away from it according to the relation between the velocity of the gas and the rate of flame propagation. If the rate of flame propagation be greater than the velocity of the gas through the tube the flame will travel against the flow of the gas and ultimately enter the vessel from which the mixture is issuing. If the velocity of the gas is greater than the rate of flame propagation the flame will travel with the flow of gas and ultimately blow out at or near the open end of the tube. If, however, the rate of flame propagation is equal to the velocity of the gas the flame cap will remain stationary, the combustible gas approaching it from one side and the products of combustion leaving on the other.

In the case of the burner shown in Fig. 3 the combustible mixture enters under pressure through the pipe A and fills the annulus (called the diffusion chamber) surrounding the combustion chamber B. Entrance to the latter is afforded by openings C so arranged that the streams of gas come from opposite directions and meet at a point where their velocity is zero. The velocity at the point of entrance to the combustion chamber of the burner will depend upon the pressure difference between the combustion chamber and the chamber from which the gas issues. Suppose now the pressure difference is such that the velocity at the point of entrance is 100 ft. a second and that the rate of flame propagation in the particular mixture under consideration is 50 ft. a second. If the gas be ignited by spark plug D after entering the combustion chamber, the flame cap will travel against the gas current until it reaches a point where the velocity is the same as the rate of flame propagation, in this case, 50 ft. a second.

Such a point must exist between the point where the velocity of the gases is zero and the point of entrance. Otherwise the flame will travel through the opening through which the gas is entering, and ignite the mixture approaching the burner. To confine the flame within the burner it is therefore necessary at all times to maintain at the point of entrance a velocity higher than that of the flame propagation. This will result in maintaining the flame within the burner and the products of combustion will issue from the outlet E of its combustion chamber.

In practical application of the burner already made it has been found that the burner can be operated over a wide range of pressure differences without adjustment and it has also been found possible to use the burner with the heaviest and cheapest grades of oil obtainable and still secure complete combustion, at least so far as the eye and nose can detect.

In case liquid fuel of low volatility is used it is of course necessary to heat the air in which the fuel is mixed and see that the latter is finely divided. In practice this is done as follows:

The air, passing through the atomizing device 25 (Fig. 2), becomes impregnated with fuel mist and is immediately conducted through tubes where its temperature is raised by contact with the hot walls of the inner tubes 11, carrying exhaust gases. This exhaust heating at constant pressure, not only effects the material increase in efficiency already noted, but serves to make a fixed gas of the mixture, which may thereafter be safely conducted to the point of combustion without fear of condensation. With gasoline this fixation is unnecessary. Hence a ready means for starting a cold engine is available.

In applying the burner to an engine it is necessary simply to see that the conditions outlined for properly mixing and volatilizing

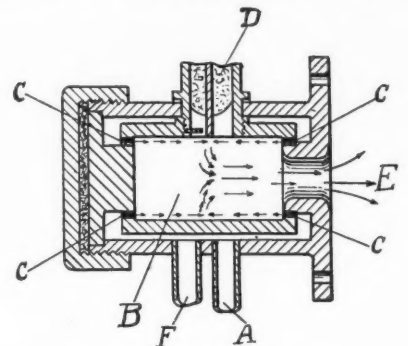


Fig. 3. Representation of Burner

the fuel are met. If the temperature of the air passing the nozzle 10, Fig. 2, is sufficiently high to cause immediate ignition of the fuel, two alternatives are open. The first is to maintain a velocity in the mixing chamber that is always greater than the rate of flame propagation in the mixture. The second is to make provision as by valves 22 and 24 (Fig. 2) whereby the mixture while on its way to the burner is too rich to ignite, that is, until sufficient air entering through auxiliary inlet F (Fig. 3) is added to this over-rich mixture in the space surrounding the combustion chamber so as to secure complete combustion.

The degree of rapidity at which the heat is liberated in the burner is indicated by the fact that it has been found possible in tests already made to melt a bar of steel inserted in a burner made of brass. The design of the burner is such that the gases entering insulate the walls so that the latter remain comparatively cool.

### Advantages of the Proposed Cycle as Applied to Automobile Engines

The advantages resulting from the use in a motor vehicle of an engine operated on the proposed cycle include all of the inherent advantages of the constant pressure cycle previously mentioned. While the field in which it may be applied is by no means limited to that of the motor vehicle this cycle is peculiarly adapted to motor-vehicle engines for the following reasons:

(1) It renders available for use fuels, such as kerosene and oil fuel, now produced in such large quantities (to supply the demand for gasoline) that they have become more or less of a drug on the market.

(2) It is thermally efficient at all loads because of the constant compression pressure, utilization of exhaust heat and other factors outlined under the heading "Advantages of the Constant Pressure Cycle."



# STEWART Quality Trucks at Quantity Prices

Form 1201

CLASS OF SERVICE	SYMBOL
Day Message	
Day Letter	Blue
Night Message	Nite
Night Letter	N L

If none of these three symbols appears after the check (number of words) this is a day message. Otherwise its character is indicated by the symbol appearing after the check.

## WESTERN UNION TELEGRAM

NEWCOMB CARLTON, PRESIDENT  
GEORGE W. E. ATKINS, VICE-PRESIDENT BELVIDERE BROOKS, VICE-PRESIDENT

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STEWART MOTOR CORPN

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SHIP EARLIEST POSSIBLE DATES ONE HUNDRED MODEL FIVE HALF TON  
TRUCKS AND TEN MODEL FOUR TON AND QUARTER

CHICAGO AUTO SALES CO

EMIL J KRIMSKY PRESIDENT

9 01 PM

1000 lb.

**\$695**

Chassis

¾ Ton

**\$1290**

Chassis

1¼ Ton

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Chassis

Chicago, one of the biggest truck markets, puts its stamp of approval on Stewart Quality Trucks. This telegram emphatically shows the big demand—the money-making possibilities for dealers selling the Stewart line. It proves the market and the Stewart.

There is still some territory open. Write or wire us for dealer proposition.

**Stewart Motor Corporation**  
Buffalo, N. Y.

(3) It produces a more uniform torque and is smoother in operation than any Otto cycle engine owing to the fact that fuel can be admitted through a considerable proportion of the stroke and that there is no sudden rise of pressure such as produces sudden and violent shocks in an engine operating on the Otto cycle.

(4) It has a considerable overload capacity. In other words the normal turning effort can be much increased either by increasing the pressure on the unloading valve and thus raising the compression pressure or by lengthening the admission period up to practically full stroke. Under these circumstances it is possible to dispense entirely with a change speed gear as is done in the case of steam-driven cars and locomotives.

(5) It can be operated on a two-stroke cycle and thus further decrease the variation in torque and the loss in power resulting from the two idle strokes in a four-stroke cycle engine.

(6) It can be built to produce much higher mean effective pressures than do engines operating on the Otto cycle. The engine therefore can be made much lighter for a given normal power than any Otto cycle engine practicable for motor-vehicle use. The design can also be made as compact as that of the motor-vehicle engines now used.

(7) It will probably require no starting device. When the engine is stopped after running for even a short period of time, air under pressure will remain in the receiver. Under these conditions it will be necessary only to open the throttle, permit the air remaining under pressure to flow into the mixing chamber and thus through the burner to the cylinder. If the clutch be held out during this starting period the air pressure even though it be low will under normal conditions be sufficient to start the engine. Once started the engine will in a few turns fill the receiver with air at the normal compression pressure of the cycle. In case an engine stops on dead center and all air in the receiver leaks out, the engine can be cranked by hand or a small hand pump used to fill the receiver.

(8) It will in all probability be comparatively free from difficulties due to the accumulation of carbon, providing a reasonably good grade of lubricating oil is employed, because of the ideal combustion conditions previously mentioned.

(9) It will operate to decrease car weight on account of its own light weight and the

fact that no gear change or starter will be required.

In view of the numerous advantages of the constant pressure cycle and the peculiar advantages of the proposed theory of construction the authors anticipate a rapid change from the constant volume to the constant pressure type of engine in automobile construction.

## LARGE SINGLE VERSUS DUAL SOLID TIRES FOR REAR TRUCK WHEELS

By W. A. ALLEN  
Manager of Truck Tire Department  
B. F. Goodrich Company

**Abstract:** This paper is mainly an argument in favor of the use of large, single rear wheel truck tires instead of smaller dual tires. Although the practice of using large singles is comparatively new, the author gives the results of experience and research to show the advantages of the newer method of rear tire equipment.

In developing his arguments in favor of single tires, the author goes into the history of dual tire application to show why it was necessary to use two tires in the earlier days of truck operation. As the necessity for increased carrying-capacity grew, tire manufacturers found the then existing single tire equipment inadequate, and they set about to develop suitable equipment to meet the new condition, the result being dual practice. According to Mr. Allen, dual tires were supposed to have a carrying capacity  $2\frac{1}{2}$  to 3 times that of a single tire of the size of which the combination was composed. The method of attaching the earlier dual tires is shown to have been poor, inasmuch as the cross bars tended to draw the rubber together in such a way that it was impossible to secure the same degree of friction over the entire base, owing to the outward spring which took place in the center of the cross-bar, thus relieving compression under these bars. This reduced the stability of attachment, which resulted in circumferential creeping of the whole tire to a much greater extent as the width of the dual equipment increased. Inability to correct this weakness resulted in conclusion to the effect that tires of such method of attachment were not suitable when widths in excess of 4 or 5 in. were employed. The metal base type of tire was developed to overcome the difficulty.

Mr. Allen holds that dual tires are overrated, and believes that the practice of saying that dual equipment is capable of carrying loads double that of the single of which it is composed, is open for discussion.

Some reasons for advocating large singles in place of small dual equipment are:

1. The contact area of single tires exceeds that of the duals which they are proposed to replace. 2. The load per

sq. in. distributed over the contact area is in every case reduced correspondingly with the increase in contact area.

3. Small dual equipment does not give satisfactory performance for the reason that neither single tire is sturdy enough to resist momentary imposition of the total wheel load, such as occurs, for example, when traveling over rough road surfaces, excessively crowned or furrowed roads. It is pointed out that in such cases one of the small tires carries during a large part of time the entire wheel load, which is shifted back and forth from one small tire to the other; with large, single units the load is concentrated on a tire sufficiently sturdy to absorb reasonable load inequalities. 4. Saving in tire cost, ranging from 8 to 15 per cent. 5. Saving in wheel cost, because of narrower felloe and wheel rim. 6. Saving in cost of handling and applying one tire in place of two. 7. Saving in wheel, tire and rim weight. 8. Fitting of non-skid chains easier. 9. Better trackage with front wheels. 10. Greater height of rubber tread, providing better cushioning properties and increasing tire life. 11. Less strain on axle and wheel bearings.

The large single tire has, however, its limitations and pending the results of further investigation, it seems advisable to consider 7 in. tires as the limit of practical single equipment.

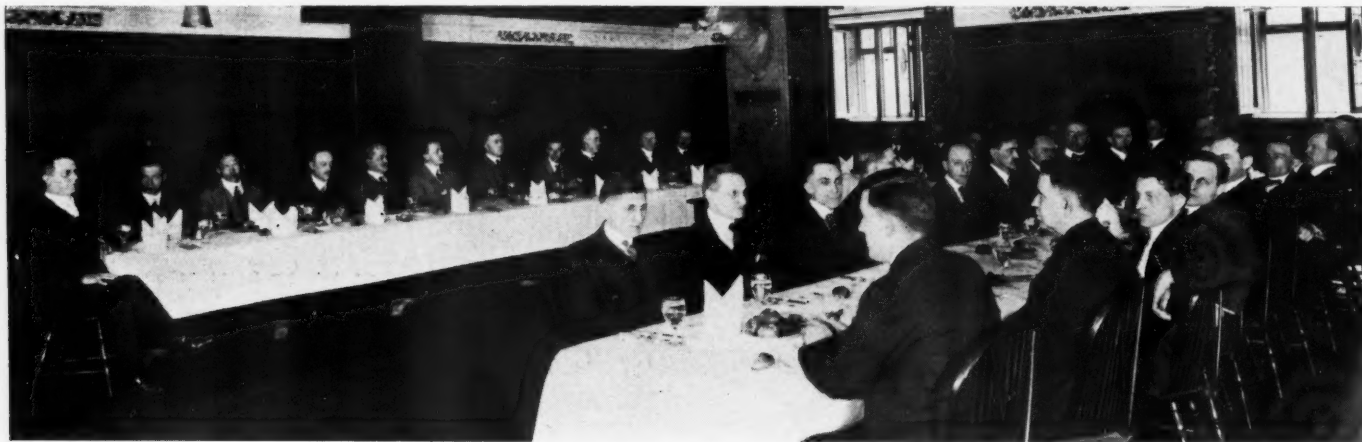


**R**ESearch and practice, covering a somewhat extended period, have brought to the author the conviction that the use of large single tires, rather than a pair of small units on rear truck wheels, while still comparatively new, has nevertheless proved a progressive development. In order to discuss the subject thoroughly a brief historical review of the solid tire industry will be enlightening.

The use of dual or twin truck-tire equipment was inaugurated during the early development of an infant industry. It was offered as the then most practicable way of meeting conditions, the exact severity of which were not thoroughly known. An accurate forecast of the variable operating conditions that followed the extension of the industry into all phases of commercial transportation was not then possible. Due to such extension, the service has become more severe along lines of greater loads, higher speed and increased zone of activity to the point of overbalancing such bettered conditions as improved roadways, more skillful operators and improved suspension and design.

### Original Reasons for Dual Tires

Early in the development of a solid tire that would satisfactorily meet the demands



**Meeting of Society of Automobile Engineers 1916 Meetings Committee and Members of Auxiliary Committees, June 1, 1916**

These men were the active workers in planning and carrying out the details connected with the cruise. They are: Russell Huff, President of the Society; Coker F. Clarkson, General Manager; G. W. Dunham, Chairman, W. A. Brush, Secretary, and W. H. Conant, Treasurer of the Meetings Committee; and Messrs. Marsh, Fijux, Stout, Rice, Terry, Adams, Bay, Spencer, Diamond, Koether, Wade, Squires, Wilson, Douglas, Stark, Zimmerschied, Hall, Brennan, H. E. Blood, Floyd, Crawford, Lane, Arndts, E. W. Sullivan, Knowles, Weed, Schneider, Hussey, Geistert, Monteith, W. B. Blood, Barton, Dusinger, Armstrong, McGough, Rockwell.

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of commercial-truck service, three requisites were encountered. Listed in order of importance, these are: (1) Large carrying capacity; (2) permanency of attachment; and (3) freedom from tendency to skid.

The necessity for increased carrying-capacity soon appeared, and shortly tire manufacturers found no existing single-tire equipment adequate to meet practicably and serviceably the new conditions. They at once started to develop suitable tire equipment, the result being that dual tires were recommended for all necessities above the range of single tire equipment. Later the practice was extended to rear wheels generally, because tires applied in dual form were in some manner calculated to equal in carrying-capacity from two and one-half to three times that of one of the units of which they were composed. Just why this was so considered has never been satisfactorily explained. It must therefore be assumed that the original capacities, which are in effect today with no material change, were reasonably accurate. Practice and observation have confirmed the fairly general reliability of these schedules. Intelligible service or performance data are scarce, however, and so we find existing capacity schedules considerably deviated from in a number of instances. All these practices should be harmonized and a new and correct schedule should be established and followed.

#### Early Methods of Attachment

Permanency or stability of attachment will now be considered, with reference particularly to its influence on dual tires. The early type of tire was attached by circumferential wires or other clamping means to provide substantially a compression of the rubber tire, in turn bringing its base into direct and firm contact with the wheel rim. The friction between the wheel rim and tire base thus obtained was designed to exceed the driving torque. Most prominent of these types was that in which solid metal cross wires were embedded in the tire base at frequent intervals and extended laterally across the tire in such a manner that the ends were exposed. Circumferential wires were fitted over these ends under sufficient tension to draw the cross wires radially inward, thereby compressing the rubber underneath so as to secure and maintain a frictional contact between the tire and rim.

Then, as at present, the application was one depending upon frictional fit to perform properly its intended function. As this type of tire was increased in width it was found impossible to secure the same degree of friction over its entire base, owing to the upward spring that took place in the center of the longer cross bars, thus relieving the compression of the rubber under these bars. As a consequence the stability of attachment was reduced, resulting in circumferential creeping of the whole tire to a much greater extent than was true of those of narrower design. This movement resulted in rapid damage to the base and the tire was rendered useless prematurely, while its tread showed almost no wear in many cases. Inability to correct this weakness resulted in the conclusion that the design was not suitable for tires of greater than 4 or 5-in. width.

It was at this point that dual tires made their entry. Even triple applications were made in some cases. While results were somewhat more satisfactory, much room was still left for improvement. No similarly fastened tire has ever been free from the weaknesses explained, particularly when used as equipment for driving wheels and when subject to varying and indifferent methods of application.

The third condition, namely that of tendency to skid, may be passed over with little discussion since this was wrongly considered as being wholly attributable to the design or character of tire. It is now generally recognized as being directly traceable to conditions of driving and braking.

#### New Type of Attachment

Early in 1909 a new tire designed to correct the weaknesses of previous types was

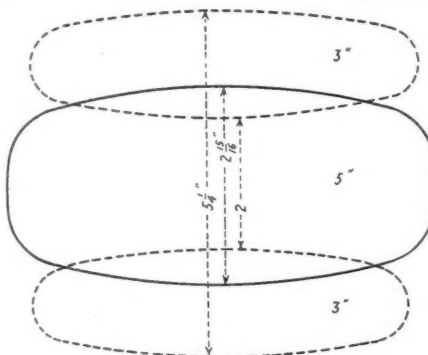


Fig. 1. Relative Bearing Contact (2500 lb. Load) for 3-in. Dual and 5-in. Single Tires

placed on the market. In general this type resembled similar tires used to some extent in continental Europe, although they were not advanced beyond the experimental

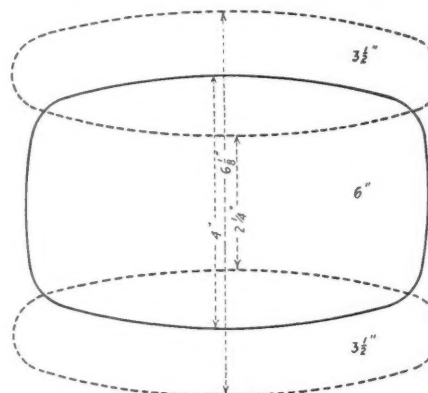


Fig. 2. Relative Bearing Contact (3500 lb. Load) for 3 1/2-in. Dual and 6-in. Single Tires

stage. The American tire, commonly referred to as the "metal base" type, embodied some entirely new features of shape and construction, and stands today, with minor refinements, as representative of the most advanced and successful practice. With the development of this tire, together with effi-

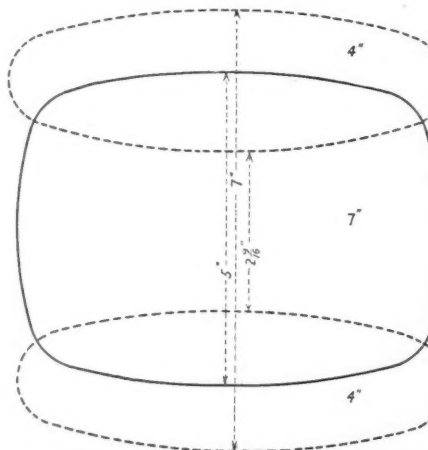


Fig. 3. Relative Bearing Contact (5000 lb. Load) for 4-in. Dual and 7-in. Single Tires

cient standardization and accuracy in wheels, we have a condition whereby correct application is practically assured in every case. The frictional fit is adequate under the most severe conditions to resist any tendency for movement of the tire in any direction, regardless of size, since adhesion of the metal base to the felloe band increases directly with the tire width. This fact accounts largely for the perfection of attachment of the rubber tread to a steel rim or metal tire base, unattainable in any other known manner. The result is uniform and successful performance, as is amply evidenced by the results obtained. Weaknesses inherent in single tires of large size were overcome in this later type, so that such tires were at once brought into the field of practicability.

#### Dual Tires Overrated

The practice of rating two tires when applied dually at from 25 to 50 per cent. more than the sum of capacities of the singles that make up the dual unit, is believed open to discussion, if not to direct criticism. No rule of theory or practice exists that will show such possibilities. It seems manifest, however, that dual tires are somewhat overrated, while singles may be somewhat underrated, according to existing schedules. This subject is under careful investigation. It is believed that a more logical schedule will be proposed in the near future. Such a schedule should in no case rate duals at more than the sum of the capacities of the single units employed. This would correspond to foreign methods, as well as be more nearly mechanically correct.

#### Single Tires to Replace Duals

Since it is proposed that single tires of certain sizes replace dual tires of stated sizes, a comparison of carrying-capacity according to existing capacity schedules for the given sizes will follow. This comparison will indicate that the proposed single tires are not equal in capacity to the dual tires they are expected to replace. In order to explain this point Table I and Figs. 1, 2 and 3 have been prepared. In each case the data are the composite results of several experiments made under ideal and similar conditions. Table I shows clearly that in every case with equal loading the contact area of single tires exceeds that of the dual tires they are expected to replace, and that the load per sq. in. distributed over the contact area arrived at is in every case reduced correspondingly with the increase in contact area. Obviously, this is in favor of the single equipment. Figs. 1, 2 and 3 show the area of contact, the shape of the area and the reduced width of tread. This reduction in width of tread ranges from 30 to 40 per cent. and is of material importance.

Table 1. Carrying Capacities of Single and Dual Tires

Size of Tire, In.	Type	Load* Applied, Lb.	Contact Area, Sq. In.	Distributed Load, Lb. per Sq. In.
36x3	Dual	2500	16.5	151.5
36x5	Single	2500	17.2	145.4
36x3 1/2	Dual	3500	23.6	148.3
36x6	Single	3500	24.0	145.8
36x4	Dual	5000	26.9	185.8
36x7	Single	5000	31.5	158.7

\*Corresponds to present schedule ratings for dual tires in sizes being compared.

#### Effects of Overload

All materials have a well defined limit of capacity for distortion in varying directions. Rubber is no exception, but its capacities are truly remarkable; in a popular sense its most natural enemy in solid-tire service can be considered as overloading.